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EDITORIALS

PROSPERITY REFLECTED IN SPRING CONSTRUCTION PLANS.

In an effort to determine with some degree of accuracy to what extent the prevailing note of prosperity would be reflected in plans for spring construction, a comprehensive survey was made among light and power companies embodying requests for advance information on contemplated extensions and improvements. In our augmented "Current Electrical News" section of March 4, we presented a copious analysis of this information, with the hope that, in addition to presenting opportunities for the sale of equipment and material, some satisfaction could be gained from such a formidable array of evidence of prosperity.

There are two outstanding features of the situation as presented by construction plans already decided. Of first importance is the fact that the electrical industry is enjoying a period of unquestionable prosperity. Of nearly equal importance is the fact that there is not the slightest feeling among leaders in the industry that this prosperity is predicated on an abnormal industrial condition and is therefore only temporary. In fact, just the opposite view must be taken, as the nature of the work planned, involving as it does, millions of dollars, bears every evidence of permanency. Lines are being constructed to entirely new territory, generating stations are being rehabilitated, and new buildings are made necessary by unusual expansion. That so much is being done even in the face of high prices for labor and material serves to emphasize our optimistic view.

From the industrial standpoint there is one particularly salient feature which is emphasized by the glowing reports of new power business. For years power engineers and salesmen have been reiterating the advantages of flexibility as one of the most pertinent to the prospective power user. In these strenuous times when factories are straining every nerve to fill orders, when additions and extensions, and sometimes practically new factories have to be built over night, central-station power is coming into its own. Nor is flexibility the only advantage being demonstrated. With overtime operation the rule, economy of central-station service becomes at once apparent.

It is gratifying, of course, to see such evidences of prosperity in our own industry, but it is also extremely pleasing to see the extent to which electricity is contributing to the prosperity of other industries.

WIRING FOR THE FUTURE.

In the many campaigns which will be undertaken this month to popularize wiring of the home, it should be borne in mind that the wiring to be installed is not merely for today or tomorrow, but will be used for many years to come. The needs of the future should be anticipated. These may reasonably be assumed to include the use of many current-consuming devices which are not under consideration at the present time, and the provision of outlets for connecting such devices should unquestionably be made. Sometimes the mere suggestion of this future need to the house owner will be sufficient to insure its incorporation in the wiring plans; in other cases an earnest talk by the contractor's representative or the central-station solicitor will be necessary to convince him that the additional expenditure is wise.

There are three elements interested in the wiring of the residence, the occupant, the contractor who does the work, and the central station. It is to the advantage of all three that the wiring be adequate for the future as well as the present. To the central station it means greater consumption in the future, and perhaps also at once. To the contractor it means a larger contract. To the owner of the home it may mean little at present, when his only thought is to secure electric lighting, but it will mean much in the future, when his conception of electric service has been broadened to include a variety of heating and motor-driven devices. Often the deciding factor in the purchase of these devices will be the facility of applying them. There will be a disinclination to call the wiring contractor in a second time, and there will be the knowledge that the total cost is less when a complete job is made of the installation in the first place.

Full discussion of these features will induce many house owners to spend a little more in the first place in order to secure facilities that will be satisfactory in the future. It will at once be realized, for instance, that a single socket in a room will soon be found inadequate. While a plug cluster may make operation of some device possible without eliminating the electric light, it is likely to interfere with the glassware and involve a troublesome extension cord. Table lamps and floor lamps are introduced largely on the score of beauty and to fulfill their mission should be connected to wall or floor outlets, as the dangling cord from a ceiling fixture may largely destroy the desired effect. Similarly, fans, sewing-machine and washing-machine motors and innumerable other devices, require wall or base-

board receptacles. A realization of all of these things should result in the exercise of some foresight and more ample provision of facilities.

Where strict limitation of the expense is the ruling consideration in an installation, the appeal for adequacy will probably fall upon deaf ears, but where a deferred-payment plan has been inaugurated, there is seldom a good reason why this consideration should be controlling. It might even be good policy for the central station to extend the period of instalment payments wherever the number of outlets exceeds a specified number. Of course it would not be well to discourage the prospective user of electric lighting from putting in a minimum lighting equipment if this seems to be the only possibility, but every encouragement should be given to secure an installation which will prove more satisfactory in the future and which will mean a greater revenue to the central station.

COURTS AND COMMISSIONS.

The question has more than once arisen as to the jurisdiction of public service commissions over utility companies whose affairs are in the toils of a court. For instance, if a company is in the hands of a receiver, appointed by the court, is it thereby placed beyond the reach of statutes which have been enacted for the purpose of regulating the rates, the service, or other operations of the utilities within the prescribed territory? The Chicago and Oak Park Elevated Railroad is a utility operating under a receiver appointed by a federal court. When the receiver refused to carry out orders of the Public Utilities Commission of Illinois, that body seemed to feel powerless to do anything in the matter. The question in that particular case was left unsettled.

The Supreme Court of Kansas has recently handed down a decision which gives an answer to this question. The Independent Gas Company, operating under a receiver, was involved in this case. The court held that receivers operating a utility are under the control of the commission to the same extent and in the same manner as the owners of the utility would be if they were operating the utility. It ruled that the commission, and not the court appointing the receiver, has power to fix rates. This ruling appears reasonable, and no doubt is just as applicable to service as to rates, and in Illinois as in Kansas.

The idea that persons possessing peculiar duties, privileges and responsibilities are thereby placed in a different position from others in regard to matters outside this particular field, is a pernicious one and needs curbing at every opportunity. It manifests itself in the disregard by officials of foreign governments for automobile speed regulations, in the illegal acts of many police officials, and in dozens of other ways. If those who find it safe to disregard law would be punctilious in observing it, we should have a much higher respect in this country for both the law and those to whom its enforcement is confided.

SAFEGUARDING ELECTRIC SERVICE BY AVOIDING CARELESSNESS.

The study of the causes of several electrical fires occurring during the past year indicates the continued importance of avoiding careless installation and handling of equipment. The safety of electrical service is undisputed, but occasional lapses on the part of operating employees, construction forces or users lead to minor troubles which easily might have been avoided. Thus, in changing over electric service from overhead to underground, in one case connections were wrongly made in the street, the neutral wire entering the building being connected to one of the outside wires in the street. The result was that the current entered over the neutral wire, passed over the ground wire to the water service, overheating the ground wire and burning off its insulation. The circuit was opened by the burning of the ground wire, but no other damage was done. In another instance the solenoid coil of a remote-control switch was overheated to the smoking point, due to carelessness in holding in a push button operating the switch and permitting current to flow continuously in the coil. No fire occurred outside the inclosing cabinet, which was fireproof.

A slight fire in a motion-picture booth was caused by an employee, with two reels of films, each inclosed in a metal box as required, attempting to operate a jack-knife switch. The metal box of one of the reels came in contact with the live parts of the switch, causing a short-circuit which melted holes in the box and set the film on fire. The damage was confined to the destruction of one film, about 1000 feet in length, and the wetting down of the booth by extinguishers. Mishandling of an oil can at the terminals of a one-twelfth-horsepower, six-volt, ten-ampere starting motor on an automobile led to a short-circuit across the motor terminals, with ignition of gasoline vapor and about $300 damage to the car.

In another case, an attempt to fasten a wire behind the terminal post of a rheostat whose binding screw had become lost, led to the formation of an arc through vibration, and ignition of adjacent paper. Improper temporary repairs in connection with restoration of service to a 0.5-horsepower motor was the verdict in another case. Again, a loose connection on the neutral wire of a three-wire set of feeders where the latter were attached to the service cutout and switch led to sparking and the burning of a wooden platform below. Secure attachment of wiring at lugs is a vital necessity of first-class service. Arcing through dampness in an installation of knob-and-tube work resulted in the burning of a few inches of wire, and a defectively insulated joint in wiring at a wall-bracket outlet led to the ignition of gas when the joint was jarred by a passing train into contact with a gas pipe.

Troubles of this character are entirely preventable,

and emphasize the importance of intrusting installation work only to approved persons or firms; of common-sense handling of equipment; and of avoiding amateur methods of extension and repair in cases where standard methods might be utilized.

ELECTRIC HEATING OF BUILDINGS.

The electrical method of heating buildings has a number of obvious advantages. It can be closely controlled, requires no attendant, does not vitiate the air, causes no dirt and leaves no refuse. It is equally applicable to a hot-air system or a radiating system. With respect to the latter it has the advantage over steam and hot-water systems that the radiators may be made self-luminous. This appeals especially to those who have been accustomed to open fires.

While electric heaters have been largely used as auxiliaries, their introduction as the main dependence for heating large buildings has been very limited. The principal installations of the kind in this country have been in the West, where hydroelectric energy is available. The heaters are usually placed in the basement, and the hot air distributed to the different rooms. This greatly simplifies the electrical installation, as compared with placing a radiator in each room. The hot-air system has the disadvantage, with respect to direct radiation, that a higher air temperature must be maintained, and consequently more power used. Where radiation falls directly upon the individual, a cooler atmosphere is equally comfortable, and at the same time a higher relative humidity can be maintained, which is another element of comfort. This element in heating is better recognized in England than in this country, and perhaps accounts somewhat for the greater popularity of radiant heaters in that country.

To secure the most economical use of electric energy in heating, the assistance of automatic thermostatic control is essential. This statement might be made with reference to any system of heating, but it is especially important in the case of electric heating because the unit of heat usually costs more from this source and because electric current adapts itself especially well to automatic control. The amount of electric power necessary for heating a building will depend upon a number of variables, such as atmospheric conditions, proportion of window space and frequency of air renewal. From one to two watts per cubic foot of air space has been found satisfactory. In severe climates the higher figure should be allowed, and dependence placed upon the control features to prevent the use of an excessive wattage. Even where thermostatic control is not adopted, there should be sufficient steps in the range of control to adapt the consumption to mild weather.

ELECTRIC COOKING IN TEXAS.

While the cost of electric heating is not found to be the prime consideration in its introduction, any more than cost decided the early introduction of electric lighting, so also cost competition with fuel is found to be a minor consideration in the introduction of electric cooking. Except as to the occasional hobby of the wealthy, cost always has been and no doubt will continue to be, one element influencing the applications of electric service. But it is by no means the controlling element. Naturally, trial installations prove most popular where cost comparisons are favorable, and hence electric cooking and house heating have both made greatest progress in those parts of the West where coal is expensive and gas is not available.

The introduction of electric cooking is, however, by no means confined to such territory as the above. Its extension in the East is progressing rapidly, and especially so where central stations are alive to the desirability of this load, are making rates appropriate to the load-factor and diversity-factor of such customers, and are pushing campaigns for its introduction. Many parts of the South already have made substantial progress in this development, and what can be done in face of the competition of cheap fuel is indicated by an article in this issue which relates the experience of a Texas company in some missionary work of this kind. The summer season naturally points the argument for electric cooking, and an expansive development in this territory is looked for when warm weather sets in. Some active publicity and sales work is required here, as in all other introductory endeavor, to secure the greatest results; but the preliminary results secured during the advance work in an off season augur well for the coming campaign, and add weight to the statement that comparative fuel costs are not the deciding element in the problem.

ELECTRICALLY HEATED CLOTHING.

An application of electric heating which has been brought into the lime-light by the European war is in warming the human body. Electrically heated blankets, chauffeurs' gloves, and similar devices have been on the market for some time, usually adapted to sources of current which do not require to be carried about the person. Soldiers are of course subject to unusual exposure during winter weather, and often under conditions which forbid exercise.

It is reported that the Teutonic soldiers have been supplied with clothing in which a resistance wire is woven to constitute a heating element. As the longest periods of inaction are represented by waiting in the trenches, it is not necessary to have individual supply, but cables are run in the trenches and connected to the nearest power plant, and the individual soldiers connect themselves to these cables.

Such preparation would no doubt add greatly to the comfort of the men in the trenches, but when the cost and the likelihood of rapid deterioration and early renewal of such clothing is considered, it seems unlikely that any large number of soldiers have been thus equipped.

Happenings in the Industry

Manufacturers Licensed to Use Resistance Wire—Program for Convention of Wisconsin Electrical Association—Electrics at Boston Automobile Show—Ohio New-Business Managers to Meet—Data on Rail Joints and Bonds—Novel Alaska Power Development—Dallas Utility Problems—Minnesota Electrical Association Meeting—Miscellaneous News Notes

Heating-Device Manufacturers Licensed to Use Resistance Wire.

The Hoskins Manufacturing Company and the General Electric Company, owners of the Marsh patent, No. 811,859, have licensed the following manufacturers of electric heating devices to use nickel-chromium wire as a resistance element: American Electrical Heater Company, Cutler-Hammer Manufacturing Company, Hotpoint Electric Heating Company, Hughes Electric Heating Company, Landers, Frary & Clark, Pelouze Manufacturing Company, Simplex Electric Heating Company, and S. Sternau & Company. Two companies at present using this wire do not appear among those licensed.

Although this licensing arrangement goes into effect at once, royalties will not be collected, it is thought, until some time next fall, when it is expected that the prices of all heating appliances using nickel-chromium wire will necessarily be increased. This action is taken since many of those non-licensed had orders booked for delivery at present prices far into the future.

It is stated by the owners of the patent that they do not intend "to proceed against any dealer, jobber or central station with respect to resale of infringing devices in the past, provided that such dealer, jobber or central station in the future purchases devices embodying the inventions of these patents made by the Hoskins company, the General Electric Company or their licensees authorized to make such devices, and does not purchase or deal in infringing devices except to dispose of reasonable stocks now on hand."

The Driver-Harris Wire Company, manufacturer of nichrome wire, a nickel-chromium wire used largely by heating-device manufacturers, stated that it was still in conference with the owners of the patent, and that so far no final decision had been made regarding which manufacturers of nickel-chromium wire should be licensed.

Program for Convention of Wisconsin Electrical Association at Milwaukee, March 16 and 17.

The Wisconsin Electrical Association's annual convention will be held in the Club Room of the Hotel Pfister, Milwaukee, Wis., on March 16 and 17, 1916.

March 16 will be a joint session with the Wisconsin Gas Association. The Wisconsin Gas Association's convention begins on March 15.

The following is a list of subjects on which papers will be presented:

"The Attitude of the Wisconsin Railroad Commission on Security Issues," by Harold L. Geisse, secretary, Railroad Commission of Wisconsin; "A Review of State Legislation During the Past Session," by John B. Sanborn, of Sanborn & Blake, Madison, Wis.; "Methods of Taxation of Public Service Companies in Wisconsin and Why Taxes Have Been Increasing Annually," by T. E. Lyons, member Wisconsin Tax Commission; "Outdoor Substations," by H. W. Young, president, Delta-Star Electric Company; "Rates for Residence Electric Service," by A. C. Babson, manager, Wisconsin Gas & Electric Company, Watertown; "Street Lighting Rates and Contracts," by G. W. Van Derzee, assistant to vice-president, the Milwaukee Electric Railway & Light Company; "Two Years' Experience One-Man Car Operation," by R. M. Howard, general manager, Wisconsin Railway, Light & Power Company, Winona, Minn.; "The Telephone Company and the Electric Utility," by H. O. Seymour, general manager, Wisconsin Telephone Company, Milwaukee.

The following subjects will be presented for discussion: "The National Electrical Safety Code," by S. B. Way, vice-president, the Milwaukee Electric Railway & Light Company. This discussion will be in conjunction with the Wisconsin Electrical Association's Committee on Overhead Distribution. "Automatic Current-Limiting Circuit-Breaking for the Protection of Railway Feeders and Rotary Converters."

The entertainment feature of the Association will be a banquet in the Fern Room of the Hotel Pfister at 7 p. m., on March 16. Speakers of national reputation will be present. Lou J. Beauchamp, famous Chautauqua lecturer and humorous philosopher, will be the principal speaker of the evening.

George Allison is secretary-treasurer of the Association.

Extensive Showing of Electric Automobiles and Trucks at Boston Automobile Show.

Novel and attractive incandescent lighting effects are a feature of the Boston Auto Show, which opened March 4 and closed March 11. Twelve-inch brass globes studded with electric lamps of various colors were suspended from the center of arches between bays, and lines of lamps outline the roof structures.

The General Vehicle Company's exhibit included a 7,000-pound truck, painted in white. There was also a one-ton chassis, for demonstrating the method of transferring the batteries and the type of drive.

The D. C. Tiffany Company, New England distributors of the Ward Special service wagon, showed a 750-pound wagon, selling for $875, for which it is claimed that the user is able to get business in territory that cannot be reached by horse-drawn vehicles. The Ward can be charged, stored and washed for $20 a month, whereas it costs about $30 a month to keep a single horse and wagon. The vehicle carries a 42-cell Ward battery and a heavy-duty, series-wound motor which drives through the propellor shaft to the rear axle. It is claimed that the vehicle will run 40 to 45 miles on a single charge. A Westinghouse automatic charging outfit is offered for $70, by D. C. Tiffany Company.

Two Detroit electric coupes and one Milburn coupe were shown by E. Y. Stimson, Boston agent. The vehicles are all 5-passenger capacity, the Milburn being notable for its light weight. The Detroits are single and duplex drive, respectively, and are of handsome lines.

In connection with the show, Boston truck dealers featured the low costs of operating this type of delivery service for coal and other heavy merchandise. New England is very progressive in adopting this type of delivery. Nearly all the large coal companies around Boston use

the electric for short hauls. One coal company operates eight 6-ton trucks and is abandoning the use of horses. The company claims that inside a 2.5-mile radius the electric is more economical than a gasoline truck. One of its 6-ton electric trucks delivered 84 tons of coal in 9 hours, at a total cost of only $15—less than 20 cents a ton delivered, including all expenses. It made 14 trips, with a total mileage of 34 for the day. The same amount of work was done per hour than was formerly accomplished by two two-horse teams, with four men, in 3.5 hours. Another Boston coal firm operates its electric trucks 18 hours per day, with two shifts, one of the sets of batteries being kept on charge during the day for the night shift, and vice versa.

Dealers in auxiliaries who exhibited were the American Storage Battery Company, Pettingell-Andrews Company, Wetmore-Savage Company and the Barnstead Electric Water Still Company, Boston.

Ohio New-Business Managers to Hold Important Meeting.

A very interesting program has been arranged for the convention of new-business men to be held in Springfield, O., on March 15, under the auspices of the Committee on New-Business Co-operation, of the Ohio Electric Light Association. There will be an address of welcome by Weare Parsons, general manager of the Springfield Light, Heat & Power Company and this will be followed by a number of extremely pertinent papers dealing with important topics. After the business session a visit will be made to the plant of the Robbins & Myers Company.

The following is the program in detail:

Paper, "The Golden Rule in the Utility Business," by E. Burt Fenton, publicity manager, W. S. Barstow & Company, New York City; paper, "The Value of Residential Business to the Central-Station Company," by G. A. Lowther, Sandusky Gas & Electric Company; paper, "Results Obtained from Kitchen Service Installations," by T. F. Kelly, commercial manager, Dayton Power & Light Company; address, "Salesmanship," by F. B. Hutchinson, sales manager, The Kelly-Springfield Motor Truck Company; paper, "Electric Industrial Trucks," by C. E. Ogden, representative, Walker Vehicle Company, Cincinnati, O.; paper, "Solving the Heating Problem and Securing the Power Business," by A. C. Shepherd, Cleveland Electric Illuminating Company.

J. E. North, of the Springfield Light, Heat & Power Company, is chairman of the committee.

Data on Rail Joints and Bonds.

"Modern Practice in the Construction and Maintenance of Rail Joints and Bonds in Electric Railways" is the title of Technologic Paper No. 62 just issued by the Bureau of Standards, Department of Commerce. The paper is largely a compilation of information in the nature of data and opinions submitted by 42 electric railway companies who answered inquiries sent out by the Bureau.

Analysis of the data shows that soldered bonds have been demonstrated to be unsuccessful and are now practically obsolete while all other types of standard bonds are capable of giving good results, but only when carefully installed.

Loose rail joints are shown to be the most prevalent cause of bond failures and as a result there appears to be a marked tendency toward the adoption of improved methods and materials in their construction. The adoption of various types of welded joints to take the place of the common bolted joint appears to be in progress in most of the larger cities. The whole problem of track bonding is shown to be in a state of evolution owing to new inventions and recent improvements in methods of construction and as a result complete standardization of these practices cannot be expected for some time to come.

The character of track bonding is determined largely by the necessity for good operation and the prevention of stray currents which have a corrosive action on underground pipes. Economic considerations are shown to be of secondary importance.

Bottom of Alaska Lake Dynamited to Connect It with Power Plant.

From Juneau, Alaska, comes information that one of the most intricate and daring tasks in the annals of mining engineering was completed in Juneau, on February 15, by the Alaska-Gastineau Mining Company, of which D. C. Jackling is vice-president and general manager. The task consisted of boring a tunnel 1,200 feet long through a mountain, installing a 42-inch pipe line two miles long, leading to the power house, installing turbines, erecting steel towers and power lines, and then exploding more than a ton of dynamite, which blew out the bottom of Annex Lake thereby connecting the lake to the generating plant of the company. The tunnel was completed within six feet of the bottom of the lake, when drills were installed, dynamite placed in the holes and exploded with an electric spark. The Annex Lake project added 12,000 horsepower to the generating plant of the Alaska-Gastineau Company, which now has a capacity of 18,000 horsepower. The cost of the project was in excess of $500,000, and the entire plant of the company, in operation at this time, cost more than $5,000,000. Annex Lake is one and one-half miles long and a quarter of a mile wide and about 200 feet deep. It is situated at Taku Inlet, 18 miles from Juneau. Aerial trams were built to transport the materials for the towers, and the wire for the transmission lines. The plan of tunneling through the mountain and tapping the bottom of the lake was conceived by D. C. Jackling, and was carried out under the supervision of Bart L. Thane, manager; H. L. Woolenberg, chief engineer, and Frank Frick, general foreman.

Utility Problem Will Be Put Before People.

By a vote of three to two the Commissioners of the City of Dallas, Tex., have voted to submit to the people at the April 4 election a charter amendment bearing on the utility problems of the city.

A "model franchise" will be submitted for approval. This will provide for service at cost and a fixed rate of return on the property of the electric light and street railway company. The franchise also places a valuation on the two properties and this valuation basis is the point on which the city officials and utility officials cannot agree.

It is possible that the utility officials will also submit a franchise to the people and present indications point to the probability of a sharp contest on the two franchises. Preliminary negotiations between the city officials and utility were reported in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN for March 4, 1916.

Minnesota Electrical Association to Meet March 21-22.

The annual convention of the Minnesota Electrical Association will be held at the Radisson Hotel, Minneapolis, Minn, March 21 and 22.

Questions of public policy, new business, company methods and engineering will receive the attention of the delegates. Among the papers to be presented will be those on "Electric Cooking," "Rates for Electric Service," "Attitude of the Central Station Toward the Consumer," "Boiler Plant Efficiency," and "Rural Line Extensions." These papers will be fully discussed and commented upon.

Miscellaneous NEWS NOTES

Los Angeles Jovians Hear Address.—Seward A. Simons, attorney, of Los Angeles, spoke on "Classic Mythology" before a meeting of the Jovian Electric League, Los Angeles, Cal., March 1. Henry F. Holland presided as president, with Fred C. Moon, chairman.

Safety Bulletin for Customers.—The Kansas City Light & Power Company is distributing to its residential customers copies of a bulletin dealing with safety and accident prevention, particularly as applies to electric service in the home.

Louisville Pays One Cent Energy Bill.—The smallest bill ever paid by the city or presented by the Louisville Gas & Electric Company has just been approved by the City Council and will be paid in due course by the city. It is for the net amount of 1 cent and has the signatures of seven city officials, including the Mayor. The company does not make a minimum charge for a meter-rental charge.

Radio Club Organizes.—The Louisville Radio Club, W. W. Smith, president, has been organized by men interested in electrical matters, both professional and amateur. The members will work principally for advancement of wireless telegraphy. Meetings are held at the offices of the Tafel Electric Company, 236 West Jefferson Street, at regular intervals and addresses delivered by experts on technical subjects.

Kentucky Electric Companies to Have Right of Eminent Domain.—Bills have been passed by the lower house of the Kentucky Legislature to permit electric companies operated by steam power to exercise the right of eminent domain, thereby placing them on a par with hydroelectric concerns; also a bill to give steam-operated companies the right to use the public roads, such as are now enjoyed by the water-power companies.

Plymouth Has New Lighting System.—Improved street lighting of the famous old town of Plymouth, Mass., was inaugurated March 1, when about 20 magnetite arc lamps on the main street were lighted for the first time. Chairman Eldridge pressed a button switch which turned the electricity on, and there were speeches by prominent citizens and an industrial parade. The energy is supplied by the Plymouth Electric Light Company.

Samuel Insull Honored at Dinner.—A dinner given to mark the recent election of Samuel Insull, president of the Commonwealth Edison Company, Chicago, Ill., as an honorary fellow of the Royal Colonial Institute of London, was given March 3, by Chicago Fellows of the Institute. This distinction of honorary membership has been conferred only five times during the organization's fifty years of existence. The Colonial Institute assumes in colonies a position similar to that of the Royal Society as regards science.

Design of Power-Station Buildings.—At a meeting of the Western Society of Engineers held in Chicago on March 6, James M. Hatch read a paper on "Power Station Buildings," this dealing particularly with the design of the structure itself and of the foundations for it. In this he urged that some consideration be given to architectural adornment which gives dignity to the power plant and has a commercial value as well. The cost of such additional artistic treatment may amount to an addition of one one-half of one per cent of the total cost of the plant. Mr. Hatch emphasized particular care in the study of the soil and drainage of the site of the plant upon which the nature of the foundations to be used must be determined. Among those who discussed the paper were Messrs. Hecht, Keller, Brandon, Walbridge, Steinman and Hatch.

Submarine Cable to Nantucket.—A submarine telephone cable is to be laid during the coming summer, to connect the island of Nantucket, off the Massachusetts Coast, with the mainland.

Lecture on Illumination.—"Light, Shade and Color in Illumination" was the subject of a lecture given before the Lynn (Mass.) Section of the A. I. E. E., March 8, by M. Luckiesh, physicist, of the Nela Park Laboratory, Cleveland, O.

Merger of Public Service Corporations Approved.—The State of Pennsylvania has approved the merger of the following 13 companies, the new company to be known as the Northwestern Electric Service Company of Pennsylvania: The Middleboro Light & Power Company, the Fairview Township, the Girard Township, the Edinboro, the Venango Township, the Venango, the Woodcock Township, the Saegertown, the Pine Township, the Summit Township and the Linesville Township Light & Power Companies to merge with the McKean Township Light & Power Company. S. M. Hatch, Erie, Pa., is president; A. O. Chapin, Erie, is secretary, and Charles Fahr, Meadville, Pa., is treasurer.

Adjustment of Rates for Electric Lighting Urged.—The Massachusetts Legislative Committee on Public Lighting has heard a petition which asks for legislation to bring about a readjustment of lighting and power rates in the state, with a view to making them more uniform and consistent. Objection was voiced to the practice of some companies of charging 10 cents per kilowatt-hour for lighting and two cents for other uses, for electricity supplied from the same mains at the same time.

New Power Plant for Buffalo.—A steam power station of 60,000-kilowatts capacity is now under construction in Buffalo, N. Y., for the Buffalo General Electric Company. The installation will include three 20,000-kilowatt turbogenerators with five boilers of approximately 13,000 square feet of heating surface each, necessary steam and electric auxiliaries, coal-handling apparatus and trestle, and intakes and discharges for the condensing system. The Stone & Webster Company is doing the engineering.

Factory Lighting Code to Be Discussed.—A joint meeting of the Illuminating Engineering Society and the American Society of Mechanical Engineers will be held Tuesday evening, March 14, at 8:15 p. m., at the Engineering Societies Building, New York, N. Y. At this meeting the subject of a new code for factory lighting will be discussed. A committee of the Illuminating Engineering Society has prepared a code for factory lighting, intended to be used by factory owners to improve their lighting conditions, and by legislative bodies to serve as a basis for legislation which shall prescribe minimum values for different kinds of factory lighting. As this subject is also of importance to the mechanical engineers, the meeting has been arranged to discuss the subject from the standpoint of the two societies. C. E. Clewell, chairman of the committee that drafted the code, will give an outline of the preliminary work leading up to the formation of the code, the necessity for it, and a brief outline of its main points. L. P. Alford, for the American Society of Mechanical Engineers, will discuss the subject and bring out those points that seem most important from the mechanical engineering standpoint. Aside from these two speakers, other prominent members of legislative bodies, representatives of labor and those interested in factory operation will be present to add their discussions. The object of the meeting is to get as wide a diversity of opinion as possible so as to make the code valuable from a practical as well as engineering standpoint.

Selling Ranges in Natural-Gas Territory

Comprehensive Electric-Range Campaign in Texas Results in 80 Sales During First Three Months and Many Prospects Are Available for Spring—Operating Data Show Average Cost Per Consumer to Be $3.00 Per Month

Seemingly a wave of electric-cooking thought is now sweeping the country. The immense amount of power business taken on by central stations during the past few years, business which as a whole has been secured at a low rate for energy, has helped central-station managers to realize that electric cooking is a desirable class of load and has such decided advantages that it can be secured at a rate which will be profitable both from the central-station and consumer standpoint. Electric-range advertising in national publications and in special sections by range manufacturers has also helped sell this idea to the central station, and the far-seeing manufacturers who started this advertising are now reaping the profits from investments so made during the past few years.

WHAT THIS ARTICLE TELLS YOU

How a territory was analyzed preparatory to initiating an electric-range campaign.

How interest was stimulated through a toy-range contest among the children.

How satisfaction is assured to users by having a demonstrator teach the proper use of the range in the home.

How the obstacle of cheap natural gas was overcome and 80 electric ranges sold in three months.

Naturally, the West, due to the low rates made possible by extensive water-power developments, took the lead in this new phase of electric business building, and much good work has been done in that section of the country. Low rates, high cost of fuel, and high cost of servant labor has helped the West in the development of the electric cooking load.

So strong, however, has been the wave of conviction that some sections where many difficulties are presented have taken up this question and are working it out to a successful solution.

Early last fall one of the utilities companies operating in Texas and serving several towns and communities, in all aggregating in population over 300,000, decided to do some exploitation work in this line and accordingly made preliminary investigations to determine the best method of procedure. Data were obtained from different parts of the country where work had already been done and with these data as a guide a study of the territory to be worked was made. In going over the field it was found that the following conditions would have to be met:

(1) Low cost of fuel in the majority of towns served. Many of these towns have cheap natural-gas fuel.

(2) The extensive use of inexpensive negro-servant labor.

(3) General lack of education on the part of the people of this section to the advantages of electricity in the household.

(4) Natural prejudice as to cost of operation of electric ranges due to small size of towns served and consequent rate for lighting purposes.

(5) High first cost of electric-range installation.

(6) Season of the year bad on account of fact a certain amount of heat needed for warming kitchen.

Viewing the whole situation it was decided that a regular campaign, in the usual meaning of the word, was not feasible and so the word "exploitation" was suggested as offering the best way to make a start. Accordingly, during the first few months' operation of the plan, no attempt has been made on a hard selling campaign, but on the other hand the company has tried to put in a few ranges in each town served and in this way lay the basis of a comprehensive campaign for the summer, naturally the best season of the year to push this business.

As a preliminary step and with the hopes of getting in touch with some live prospects a demonstration was held in October at the State Fair in connection with the other exhibits of the company. Two demonstrators were placed in charge here and everyone manifesting any interest in the subject was talked to and a considerable number of active prospects in various towns thus secured. These were followed up later.

Obtain Interest of Children.

Another educational move which created general interest was held during "Electrical Prosperity Week." This

Shipment of Electric Ranges on Way to Installation.

After a Range Is Sold a Demonstrator Instructs the Housewife How to Obtain the Best Results.

was in the form of a "Toy Range Contest" which has been previously described in these columns. An illustration of one of the young winners is shown herewith. By getting the children interested in electric cooking it was hoped to indirectly interest their mothers and this ideal will undoubtedly bear fruit later. This toy range as an introduction to the larger electric range, in the writer's opinion, is one of the best ideas ever evolved. This same "toy" plan has also proved successful in the case of a well known make of vacuum cleaner. One of these little ranges was given away in each town where the company operates.

Coming back to the general plan of exploitation it was decided that on account of low fuel cost in many of these towns, economy of electric cooking would carry little selling weight and following the line of least resistance no towns having cheap natural-gas fuel were worked, except in a few isolated cases where prominent families who lived some distance from the gas mains were found. Little trouble has been found in securing this latter class of business as in most cases such families are well able to afford the first cost of installation as well as the operating cost which, as data below will show, is very reasonable.

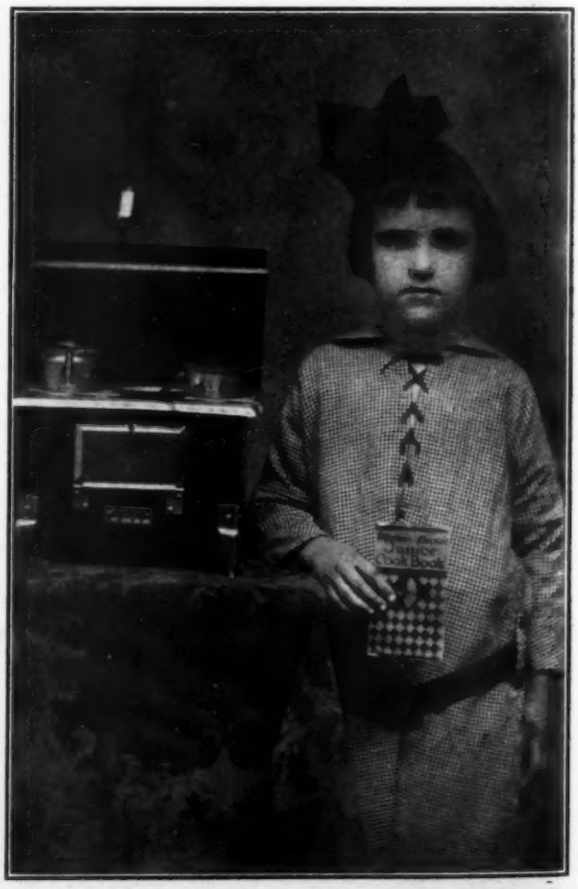
Three cooking rates were established, these being applicable to different installations. It is left to the choice of the customer which rate he will take, but this choice usually falls back on the company. As seen from the data the average net rate for residential business amounts to approximately three cents per kilowatt-hour.

Demonstrators Teach Use of Ranges.

The second difficulty, that of educating the servant, has been found to be not so hard as first imagined. In each branch town a local demonstrator, who works on commission, has been secured. It is the duty of these demonstrators, in most cases domestic-science instructors, to develop prospects and to make actual sales where possible. Their main work, however, is to keep in touch with prospects where ranges have been installed on trial and teach these prospects the proper use of the range. These ladies receive a commission for placing a range on trial and receive another commission if the sale is made. In connection with the servant problem some difficulty was met in preventing the servants from doing "boiling" on the top of a range. Boiled dinners are prevalent in many parts of the state, especially in the fall. To overcome this tendency which results in excessive current consumption, all ranges being sold are equipped with what is known by the manufacturer as "vegetable cookers." These cookers are sunk into the top of the range and have a steam casing around them. They take very little current and operate in a manner similar to the ordinary "fireless" cooker. All ranges sold have at least one of these cookers and many of them have three. The type which has three is more suitable for this territory.

No general educational work other than demonstrations has been attempted as yet, though an extensive campaign is now being planned to overcome this difficulty. When the first visit is made to a town by salesmen, a lady demonstrator goes with them and a demonstration held in the local office to serve as an introduction to that particular town. These demonstrations are advertised and if for no other reason than curiosity are well attended. It is up to the salesman to pick out the interested prospects and follow them up. One salesman and a lady demonstrator assisted by a manufacturer's representative have so far been doing all the work, but the company's regular house-wiring salesmen are being "broken" into the game, the idea being to make use of them in the spring campaign.

In order to overcome most easily the natural prejudice as to cost of operation, all ranges have been installed on



Interest in the Campaign Was Fostered by a Toy-Range Contest In Which the Grown-ups Also Participated.

Form 195 ELECTRIC RANGE PROSPECT. 200-11-22-15.

Mrs._____ Type of Range
Address_____ R-1___ S-1___
Town_____ S-2___ S-3___

Number in family_____ Adults_____ Children_____
Circumstances: Excellent_____ Good_____ Poor_____
Probable number of payments 3____ 6____ 9____ 12____
Present fuel: Wood_____ Coal_____ Gas_____ Oil_____
Demonstration promised _____
Given_____ Probable date of sale_____
Has prospect an automobile? Yes_____ No_____

Personal friend of,
Mrs.. _____ Town_____
Why a prospect? _____
_____
Date of calls _____
Literature sent _____

Form Used for Tabulating Data on Prospects.

30-day trial, the company standing the cost of installation in case the range is not purchased. While this method is expensive in that it requires a large stock investment and the cost of wiring in some few cases, nevertheless, in the long run, it is probably the most economical. Prospective users will not have a range installed on free trial unless they are reasonably sure of keeping it if it proves satisfactory. Sales are more easily made on this basis and the full confidence of the prospective user is obtained. This plan has been followed throughout all the work and while in some few cases ranges have been changed (another type substituted) 90 per cent of all trial installations made have resulted in purchases and in every case enthusiastic users. The spirit of co-operation and service suggested to a prospect when this plan is mentioned makes a strong appeal and in the work to be done this spring the company will no doubt profit by the recommendations of the customers already obtained. It was estimated that the average consumption of the residential user would be approximately 100 kilowatt-hours per month with a net bill of $3.00. The data given will show that this estimate has been very closely approached

Until the present time most of the families approached have been of the better class and those who could afford the initial cost of the range. However, a deferred-payment plan exists whereby payment can be made along with the light bill for a small amount each month. This has been found satisfactory.

Electric Water Heater as Adjunct.

Perhaps the biggest stumbling block has been the season of the year. Although the climate of Texas taking it the year round is comparatively mild, nevertheless heat is required during some of the winter months and this is usually the first question brought up. "How am I going to heat my kitchen?" This is a serious objection at such a time of the year and one which puts the salesman on his mettle. While "Cook and keep cool" can be the sales slogan in summer it does not apply in winter. When this question is brought up it is explained to the prospect that the electric range can hardly be used for heating the kitchen and a small wood or coal stove is suggested. This objection will of course not be met in the North and West where houses are steam-heated or heated from some central source. In some cases it is impossible to overcome this objection and all the satisfaction that can be obtained is to get the prospect's promise to go into the matter in the spring.

Another objection frequently met is the matter of heating water. It is probable that this objection will be stronger when the towns which have an artificial-gas or natural-gas supply are visited. A coil heater has been secured for this purpose, this heater being installed on one side of a double-throw switch so that it cannot be connected to the line while the range is in operation. This insures the company that the maximum demand on transformers will not exceed the maximum demand of the range.

In three months' time 80 ranges have been placed in service, and while some of these are still on trial, the trial period not having expired, the majority have been sold. These ranges represent installations in 21 different towns, so it will be seen that good distribution has been secured.

In the spring it is planned to make an aggressive campaign and with this object in view the names of all prospects in the territory are being secured together with a considerable amount of data which will be of interest in pushing the business. These data are turned in on "Prospect Cards," an illustration of one being shown herewith. This gives information which will be useful to the salesman in introducing himself and information which can be used to make a personal appeal in circular letters. Form letters will be used and postscripts containing personal points will be typed into these as they are filled in. By means of these cards the mailing list can be divided into almost any desired classification and letters which are definite and appeal to the particular prospect can be constructed and sent out. For example, a special appeal might be made to all prospects who use wood for fuel.

"Service," the essential of good business in public service work, has been recognized and accordingly a transformer is being put in on every range installation to insure proper voltage regulation. Of course, as the number of ranges increases the ratio of transformers to ranges will decrease. Good regulation, however, is absolutely necessary in the operation of electric ranges and this is a precaution which should be given careful consideration.

The data given herewith show results of operation in eight typical cases.

Operating Data.

(A) Type of range—low oven. Two hot plates, three cookers and oven burner. Capacity 6 to 15 persons. Total connected load, 3,500 watts. Total days operated 63. Kilowatt-hours used 294. Average net monthly bill $3.46.

(B) Type of range—low oven. Two hot plates, one cooker and oven burner. Capacity 6 to 12 persons. Total connected load 4,500 watts. Total days operated 45. Kilowatt-hours used 108. Average net monthly bill $1.96.

(C) Type of range—low oven. Two hot plates, one cooker and oven burner. Capacity 6 to 12 persons. Total connected load 4,500 watts. Total days operated 49. Kilowatt-hours used 195. Average net monthly bill $2.75.

(D) Type of range—low oven. Two hot plates, one cooker and oven burner. Capacity 6 to 12 persons. Total connected load 4,500 watts. Total days operated 37. Kilowatt-hours used 127. Average net monthly bill $2.66.

(E) Type of range—low oven. Two hot plates, three cookers and oven burner. Capacity 6 to 12 persons. Total connected load 3,500 watts. Total days operated 41. Kilowatt-hours used 136. Average net monthly bill $2.71.

(F) Type of range—low oven. Two hot plates, three cookers and oven burner. Capacity 6 to 15 persons. Total connected load 3,500 watts. Total days operated 56. Kilowatt-hours used 180. Average net monthly bill $3.11.

(G) Type of range—low oven. Two hot plates, three cookers and oven burner. Capacity 6 to 15 persons. Total connected load 3,500 watts. Total days operated 44. Kilowatt-hours used 143. Average net monthly bill $3.44.

(H) Type of range—low oven. Two hot plates, three cookers and oven burner. Capacity 6 to 15 persons. Total connected load 3,500 watts. Total days operated 45. Kilowatt-hours used 119. Average net monthly bill $2.77.

The general average kilowatt-hour consumption on these installations for 30 days is 103. The average net monthly bill for 30 days is $2.90. It is interesting to note that 62.5 per cent of these installations run below the average.

Electricity in Shoe Manufacturing

A Discussion of the Advantages of Electricity in the Shoe-Manufacturing Industry with Special Reference to the Application of Electric Heat

Industrial Power Series—Article No. 157.

Shoe manufacturing is an industry in which great advancement in production has been brought about during the past 50 years. Early methods of shoemaking consisted entirely of hand processes. The itinerant shoe maker went about the country, stopping in the homes and there producing the shoes needed by the family.

The early shoemaker who undertook the business of producing shoes for market cut the leather into parts which he distributed to people of the neighborhood, the latter making up the shoes at their homes. In this development of the industry, the men did the heavier parts of the work and the women did the sewing and other lighter processes.

About 1850 this "farming out" method of production gave way to centralized, factory production. At the present time the shoe making industry is so specialized that most parts are bought of manufacturers making a specialty of that part, the shoe factory being practically an assembling shop of the various parts into the completed shoe.

The use of electricity in shoemaking was originally confined to the means of drive for the various machines. During the past few years, the application of electricity has been extended, so that now there are nearly a score of shoe machines which have electrically-heated adjuncts. Among these are wax-pots on stitchers, backing presses, stamping and embossing machines, welters, bobbin winders, knurling machines, treeing irons, burnishers and tool and knife heaters. Principal manufacturers of these machines are the United Shoe Machinery Company, Beverly, Mass., and the Boston Last Company, Boston. The heating apparatus employed by the latter concern is the Simplex type, made by the Simplex Electric Heating Company, Cambridge, Mass.

Uses of the backing press, by which electric heat is applied to parallel disks between which cloth backing is glued to thin leather, giving the latter greater durability, have resulted in great savings, it being possible, as never before, to utilize scraps and practically waste pieces of leather. A Haverhill, Mass., shoe factory using a backing press finds the cost to be about one cent a pair.

One of the most active workers in the introduction of electric heating in shoemaking processes is Davis M. DeBard, of the Edison Electric Illuminating Company, of Brockton, Mass. In a recent issue of the Stone & Webster *Journal*, Mr. DeBard describes the process of

Group of Motors in Shoe Factory Driving Machines on Floor Above.

"Making" Room Showing Use of Racks.

Cutting Room of a Shoe Factory.

manufacture in his locality, which is one of the largest shoe-manufacturing centers in the world. A large share of the machinery drive is by electric motors, and the use of electrically heated machinery is rapidly increasing, displacing gas, steam, etc.

The departments of a shoe factory usually consist of cutting, stitching, lasting, making, finishing, treeing, dressing and packing rooms, the shoes going from one operator to another and from one department to another. Each operator performs one operation only, for which he is paid so much per pair. The racks start in the lasting room and continue in a straight line through the factory to the packing room, where 24 pairs are placed in a case for shipping.

To increase the output of a shoe factory, not planned for in the original layout, entails considerable expense, as the rows in each department must be pushed along to accommodate additional ones, keeping their same order so that the racks will follow the same straight line through the factory. The average shoe factory making 1,800 pairs of men's goodyear welt shoes per day requires approximately 50,000 square feet of floor space, 500 operators and 100 horsepower in motors. The layout of such a factory, with the number of kilowatt-hours consumed by each department per 100 pairs of shoes made, is given herewith.

Reckoned at the average rate for such service from the central station, the cost of electricity used would be about one cent per pair. It has been difficult sometimes to interest shoe manufacturers in central-station power, because this item is such a small one in shoe manufacture.

Formerly, it was necessary for shoe factories to have live steam for process work, *i. e.*, to heat glue, wax, etc., and to soften the upper leather when drawn onto the soles. The application of electric heat simplifies the central-station power salesman's problem, as the argument for steam drive is no longer as valid as before, and the heating of the factory can now be done by low-pressure steam, without the need of highly paid licensed steam engineers; and the heating problem is entirely absent six months of the year. The processes formerly calling for gas, *i. e.*, those of stamping and embossing, now are performed with electric heat; hence the whole problem of heat and power is reduced to the single factor, electrical energy.

MOTORS.

Department.	No.	Horsepower.	Kilowatt-hours per 100 Pairs.
Cutting room	1	7.5	2.9
	2	1	
Stitching room	7	1	4.8
	2	2	
Lasting room	1	3	.8
Making room	1	2	
	2	3	
	3	5	12.2
	1	10	
	1	7.5 (blower)	
Treeing and Dressing room	2	1	.3
Finishing room	1	2	
	2	5	6.3
	1	10 (blower)	
Sole leather room	1	7.5	2.9
Elevators	1	3	.9
	1	7.5	3.1
Electric heating	..	....	2.
Electric lighting	..	....	
Total	30	103	36.2

Group of Motor-Driven Eyelet Machines.

Group of Motor-Driven Die Cutters.

Mr. DeBard describes, in the article mentioned, the important part electricity is playing in the production of rush orders received by Brockton firms for shoes for the armies of foreign countries. "One factory owner stated that he could not have taken an army order had he not had central-station service," he says. "In two instances the connected load has doubled and the normal output trebled in 30 days. In one instance a four-story addition to a factory 50 by 100 feet was started, completed and equipped within 15 days."

Some factory managers have claimed that shoes could not be produced at a profit with night work, because of the large number of skilled laborers, with excess wages, the exactness of work required, and for other reasons. There are, however, a large number of shoe factories at present operated almost continuously night and day. Lighting arrangments have been perfected, so as to facilitate work, and the central station also takes care of power requirements. In fact, the 24-hour load is raising the valley of several central-station curves remarkably.

A factory making army shoes has evolved the following interesting data:

SHOE FACTORY TEST.

Connected Motor Load—247.5 horsepower.
Connected Light Load—52 kilowatts.
Connected Heat Load—2.55 kilowatts.
Average kilowatt-hours used per 100 pair of shoes made, 16.45.

24-Hour Day.	Power, Kilowatt-hours.	Light, Kilowatt-hours.	Heat, Kilowatt-hours.	Total Kilowatt-hours.	Power, Maximum Demand Kilowatts.	Power, per Cent Load Factor.	Power, Average Power-Factor.	Light, Maximum Demand Kilowatts.	Heat, Maximum Demand Kilowatts.	Pairs Shoes Made.	Kilowatt-hours 100 Pair Shoes.
1	2,410	490	12	2,912	140	67	77.0	39.0	1.44	18,000	16.2
2	2,380	510	15	2,905	140	66	69.9	38.4	1.92	18,000	16.2
3	2,490	500	13	3,003	142	69	69.6	42.2	1.4	18,000	16.7
5	2,680	530	10	3,220	148	74	68.4	40.3	1.8	18,000	17.8
4	2,400	500	5	2,905	140	67	72.2	40.3	1.8	18,000	16.2
6	2,320	500	15	2,835	145	64	66.8	42.2	1.9	18,000	15.7
7	2,460	520	18	2,998	142	68	69.7	42.2	1.7	18,000	16.6
8	2,320	500	17	2,837	135	64	67.5	42.2	1.9	18,000	15.7
9	2,430	520	17	2,968	135	62	69.4	42.2	1.9	18,000	16.5
10	2,530	520	9	3,059	150	70	72.0	42.0	1.5	18,000	16.9

With a day and night shift, on the usual central-station power rate, the cost of electrical energy would be less than one-half cent per pair of shoes, which shows, by comparison with the data given above, to what extent maximum production reduces the net cost. Progressive central-station managers in shoe-manufacturing districts will do well to see whether electrical operation cannot be extended further along the lines of heating of machines, as well as in the direction of improved incandescent lighting, and universal motor-drive.

Candlepower Measurements of Series Gas-Filled Incandescent Lamps.

Considerable discussion has taken place of late as to the best method of rating the candlepower of incandescent lamps. That the horizontal candlepower is far from satisfactory is well known. Some test results were given by Ralph C. Robinson in a paper read at the midwinter convention of the Illuminating Engineering Society.

Several Mazda C lamps were made up for 6.6-ampere series circuits. They were of the so-called 80-candlepower type in the regular S-24½ bulbs. The filaments were spiralled in the form customary in this lamp but were mounted in four different positions. The object of the experiment was to determine the reduction-factor for the calculation of spherical candlepower from the mean horizontal candlepower. To make the lamps more nearly comparable, the filaments were all operated at the same temperature, 2,825 degrees Kelvin. To make the candlepower reading easier and more accurate, blue screens were inserted in every instance between the standard lamp and the photometer.

As is well known, the mean horizontal candlepower of gas-filled lamps cannot be determined by the usual method of rotating the lamp. For this reason, the candlepower was measured at every ten degrees around the lamp in a horizontal plane and the mean of these values taken.

The spherical measurements were made in a 50-inch Ulbricht sphere, using the same method to get a good color match as was used in the horizontal determinations.

The results obtained are tabulated below:

		Mean horizontal.		Spherical.		
Filament mounting.	Watts	Candle-power.	Watts per candle.	Candle-power.	Watts per candle.	Reduction factor.
V-shaped	66.2	100.7	0.66	82.5	0.805	0.82
Vertical	75.5	126.8	0.595	93.7	0.805	0.74
Horizontal	75.9	93.5	0.82	95.2	0.800	1.01
Diagonal	77.5	122.0	0.635	95.2	0.815	0.78

This table shows several very interesting results. First, the mean horizontal watts per candle are very different for the different filament mountings. This is due to the fact that the horizontal filament in certain positions is almost completely hidden by the lead wires, or by other portions of the filament, thus making the mean candlepower low. In the case of the vertical filament, very little is hidden at any point, so that the mean horizontal candlepower is high. The V-shaped and diagonal filaments are affected less than the horizontal, and hence their horizontal efficiency is better, although not so good as that of the vertical filament.

The watts per spherical candle are practically the same for the different types of filament.

Inspecting and Packing Shoes for Export in a New England Shoe Factory.

Shoe Factory Working at Night Supplying War Orders.

Power-Customer Statistics in Massachusetts

An Interesting Analysis Showing Extent of Power Development in 24 Municipalities with Reference to Population, Energy Used and Rates

In our issue of February 26, 1916, there was presented a study of lighting customers of important central stations in Massachusetts, showing the relation between the number, and consumption of energy, of consumers in varying territories, with some reference to prices of commercial lighting.

Herewith is presented a table showing the nature of plant and the characteristics of territory, the population, number of customers for power, their average kilowatt-hour consumption and the relation of price to the lighting rate. A careful study of these figures shows that the number of kilowatt-hours of energy per power customer varies as widely as thirteen-fold; i. e., from a minimum of about 3,000 to a maximum of nearly 40,000 hours per year. The low figure is found in the case of a small steam electric plant serving a distinctly summer-tourist and "aristocratic" residential seaside city of about 20,000; while the high figure represents a plant which is linked in with a system of hydroelectric transmission, though generating locally in large part, and serving a community noteworthy for its diverse industries, in the operation of which motorized machinery plays an important part.

Other companies and plants which do a large power business are those of the central part of the state, all or most of which are connected with the hydroelectric system referred to, but having steam plants which are either kept in reserve for emergency service, or operated as auxiliaries, all or part of the time. These plants are characterized by overhead transmission systems, for the most part, with underground construction only in the local business centers. Such lines as those which tie the stations together are partly on private right of way, and operated at high voltages. It is to be noted that the number of power customers per 1,000 population is in almost exactly inverse ratio to the kilowatt-hours per customer, in a large majority of instances noted.

On the other hand, it is observed that the large urban centers, generally, have the largest number of power customers per 1,000, with correspondingly small number of hours used by each. This would indicate the prevalent use of a few, or single, motors by a large number of firms or individuals, whereas the opposite situation represents a few very large motorized establishments. The metropolitan area exemplifies this condition, the number of customers being comparatively large, and their use of current for power purposes relatively small. The yearly average for the Boston territory is about 3,200 kilowatt-hours per customer.

Textile centers are evidently, as yet, small users of central-station power, though there is a marked tendency toward the adoption of central-station drive in cotton and woolen mills. Notable examples of this are the Pilgrim mill at Fall River, Arlington mill at Lawrence, Naumkeag, Salem, and the recent decision of the proprietors of the Manomet mill, New Bedford, to equip a new mill with central-station motor drive. These are, however, exceptions to the general condition, that of steam or water-power propulsion. Shoe-manufacturing towns, however, show a good proportion of power customers, and consumption per customer is well above the average. Suburban residential communities in general call for power in small units, in connection with diversified trades.

A remarkable exception to the general rule is found in the case of Cambridge, which, though largely residential, is also an important manufacturing center. Here there are a large number of large power customers, central-station energy being applied to as widely diverse activities as pork-packing on the one hand, and text-book manufacture on the other hand, with the operation of Harvard in between.

The relation of power consumption to the whole population shows some interesting divergencies. The largest amounts are found in large centers having large industrial plants; while the averages reach their minimum in suburban residential and summer-resort communities. Textile cities, however, average low.

PLANT	Nature of Territory	Population	No. Power Customers	Kw. Hrs. Sold for Power	Kw. Hrs. per Customer	Kw. Hrs. per 100 Population	Power Customers per 1,000 Population	Average Power Rate, Cts.	Average Commercial Lighting Rate Cts.	Ratio of Power to Commercial Ltg. Rate Per Cent
Small Central Station Co.	Small Industrial City.	19,000	163	1,861,000	11,417	9,795	8.6	7-1.75	(11 cts.)	..
Large Steam Plant.....	Suburban Industrial..	105,000	445	6,166,000	13,856	5,865	4.2	2.725	8.573	32
Metropolitan Company...	Boston and Suburbs..	987,000	9,201	29,605,000	3,222	3,000	9.3	3.673	6.334	58
Medium Size Central Sta.	Shoe Mfg. Center.....	94,000	421	3,892,000	9,244	4,140	4.5	3.191	9.750	33
Distributing Co. for Hydro-Electric.....	Scattered Industrial...	28,000	40	1,112,000	27,800	3,971	1.4	1.812	13.112	14
Large Central Station....	Textile Mfg.....	126,000	209	6,707,000	32,091	5,323	1.7	1.969	8.316	24
Small Steam Plant.....	Diverse M'f'tures.....	38,000	121	4,833,000	39,942	12,719	3.2	1.725	11.066	15
Distributes Hydro Elec...	Few Large Mills.....	20,000	176	2,454,000	13,943	12,270	8.8	1.736	9.586	18
Municipal Plant.....	Large Paper Mfg. Cen.	58,000	272	8,013,000	29,459	13,813	4.7	1.838	5.935	31
Combination Gas & Elec. Co.....	Textile City.....	111,000	507	1,556,000	3,069	1,402	4.6	3.851	9.871	39
Med. Sized Steam Plant..	Textile City.....	125,000	436	4,373,000	10,030	2,498	3.5	2.934	8.229	35
Combination Company...	Shoe Mfg. City.....	105,000	445	3,969,000	8,919	3,780	4.2	2.434	8.371	29
Med. Sized Steam Plant..	Suburban Residential.	117,000	341	2,322,000	6,809	1,984	2.9	3.491	10.187	34
Small Steam and Distributing.....	Shoe Town.....	25,000	179	1,097,000	6,128	4,388	7.1	10-1.5	(15-12)	..
Large Steam.....	Textile City.....	107,000	368	2,037,000	5,535	1,904	3.4	2.662	8.839	30
Small Steam.....	Interior Industrial....	23,000	94	2,319,000	24,760	10,082	4.1	2.186	8.199	27
Small Steam.....	Diverse Industrial....	38,000	372	1,956,000	5,231	5,147	9.8	2.242	8.153	27
Small Steam.....	Residential & Tourist.	18,000	193	563,000	2,917	3,128	10.7	10-3	(14.4-9)	..
Steam Station.....	Suburb Res. and Small Ind.....	33,000	131	877,000	6,695	2,839	4.0	10-4.5	(13.3-10)	..
Med. Sized Steam Station	Residential Shoe and Textile.....	44,000	203	4,021,000	19,808	9,137	4.6	1.702	9.736	17
Steam Station.....	Residential and Summer Resort.....	28,000	85	374,000	4,400	1,336	3.0	4.5-1	(11-5)	..
Large Steam Plant.....	Intensely Industrial...	104,000	721	9,212,000	12,776	8,857	6.9	2.302	6.852	33
Large Steam Plant.....	Intensely Industrial...	149,000	614	13,957,000	22,731	9,367	4.1	2.096	7.345	28
Med. Sized Steam.....	Shoe Mfg. City.....	44,000	303	3,398,000	11,121	7,723	6.9	2.387	9.894	24

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

Minneapolis Company Establishes Low Cooking Rate.

The Minneapolis (Minn.) General Electric Company has put in effect an electric cooking rate of 2.5 cents per kilowatt-hour, less 5 per cent for prompt payment. The rate applies to all electric current used in residences after the first six kilowatt-hours per room per month, all current used by the customer passing through the one meter. During the past several weeks the Minneapolis Company has been advertising preliminary to the sale of electric ranges. It is the intention to develop the electric cooking business of Minneapolis, where it is believed the substitution of electricity for other fuels in the kitchen will become popular within a short time. Various manufacturers of electric ranges are preparing to do a large business in Minneapolis during the coming summer.

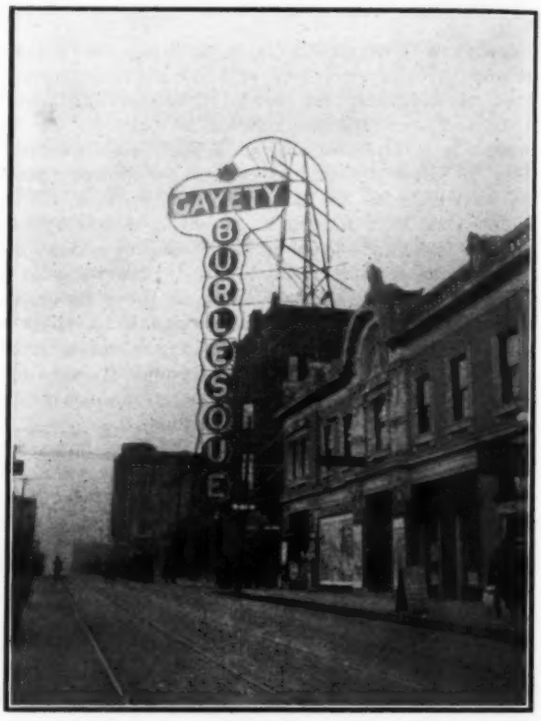
Effective House-Wiring Appeal.

The Concord (N. H.) Electric Company, in featuring its house-wiring campaign, utilizes the idea of the brightness and warmth that are implied by an electrically-lighted home, particularly in the frigid winter climate of Northern New England. Art and argument combine to render the accompanying newspaper advertisement, which occupied a space five columns wide in the local newspaper, appealing to every householder in the Concord company's territory. The manager, Levin J. Chase, is widely reputed for the cleverness of his publicity output.

A special house-wiring offer is being made by the company during the campaign.

Concord Homes
are "brightening up"—never before were so many houses being wired for Electric Service.
There is nothing surprising about this— house-wiring today is so simple and inexpensive that the wonder is that every building in Concord isn't wired throughout!
The day of Universal Electric Service is certainly not far distant— our special house-wiring offer is designed to hasten its arrival.
Its two principal features are, NO MONEY DOWN and NONE OF THE USUAL BOTHER THAT GOES WITH THE INSTALLMENT PLAN!
Ask about it today!
Concord Electric Company.
"Trade in Concord"

Attractive Advertisement Used in Concord House-Wiring Campaign.



New Kansas City Sign Visible in Four Directions.

New Kansas City Sign Visible in Four Directions.

The electric sign on the Gayety Theater, Kansas City, Mo., is one of the most striking in the city, and is designed to be visible from four directions, similarly to the electric sign on the Willis Wood Theater, previously described in these columns. The Gayety sign is 75 feet high and 26 wide, and contains 3,226 10-watt lamps on the 110-volt city circuit. It is mounted on a tower extending 45 feet above the roof, the tower having been built in Kansas City. The sign is equipped with a flasher, which spells out the words "Burlesque" and "Gayety," one letter at a time. All letters are five feet. The framework is mesh, the letters having solid background. The sign itself weighs about 3,000 pounds, the tower weighing about four tons. The tower rests on a roof space about 18 feet square, as shown in the accompanying illustration.

Activity at Lowell, Mass.

The Lowell Electric Light Corporation, Lowell, Mass., is delivering more energy regularly than ever before in its history, resulting largely from large power customers, several of whom are operating on a 24-hour schedule. During the past month the company has sold a large number of household electric utensils. Indications point to a good business in house lighting and appliances during the coming months.

Pittsfield Company Offers Premium to Stimulate House Wiring.

In order to stimulate house-wiring before the rush period, the Pittsfield (Mass.) Electric Company is offering a six-pound electric iron as a premium for contracts calling for the wiring of already-built houses. The accompanying illustration shows an advertisement featuring this offer and giving the details of the campaign.

The schedule adopted for this campaign embodies the following features:

The following prices are only for single and double buildings outside of the first fire district and are based upon acceptance within 30 days from quotation and upon the use of iron conduit for the entrance from the outside of the building to the cellar and upon the use of either iron conduit or flexible armored cable for all wiring in the cellar.

No. 1. Iron conduit entrance and outlet or receptacle located in any room on the first floor anywhere except ceiling	$12.92
No. 1 and 1 outlet additional	16.56
No. 1 and 2 outlet additional	19.50
No. 1 and 3 outlet additional	22.50
No. 1 and 4 outlet additional	25.57
No. 1 and 5 outlet additional	28.69
No. 1 and 6 outlet additional	30.92
No. 1 and 7 outlet additional	33.18
No. 1 and 8 outlet additional	35.48
No. 1 and 9 outlet additional	37.82
No. 1 and 10 outlet additional	40.20
No. 1 and 11 outlet additional	41.85
No. 1 and 12 outlet additional	43.50
No. 1 and 13 outlet additional	45.15
No. 1 and 14 outlet additional	46.80
No. 1 and 15 outlet additional	48.45
No. 1 and 16 outlet additional	50.10
No. 1 and 17 outlet additional	51.75
No. 1 and 18 outlet additional	53.40
No. 1 and 19 outlet additional	55.05
No. 1 and 20 outlet additional	56.70
No. 1 and 21 outlet additional	58.35
No. 1 and 22 outlet additional	60.00
No. 1 and 23 outlet additional	61.65
No. 1 and 24 outlet additional	63.30
No. 1 and 25 outlet additional	64.95

In houses of mixed flooring the prices will be the same as given in the preceding table except as follows:

Located under double flooring, otherwise than hardwood, second or third story;	
Ceiling outlet	$1.00 extra
Switch outlet (controlling any center outlet)	1.00 extra
Located under hardwood flooring, single, double or triple, second or third story;	
Ceiling outlet	$3.00 extra
One switch outlet (controlling any center outlet)	3.00 extra
Additional switch outlets on same gang (controlling same center outlet)	1.50 extra

The cost of hardware and drop cords, to be added to the above items depending on the number of outlets, is as follows:

Push button switches, each	$1.00 extra
Push button 3-way switches, per set of 2 switches (3-way snap 50c)	2.75 extra
Porcelain base switches, each	.35 extra
Porcelain base Edison receptacles, each	.35 extra
Base board flush plate receptacles, each	1.15 extra
Drop cord, key socket, each	.60 extra
Drop cord, chain socket, each	.75 extra

(3-way switch outlets to be counted as 2 outlets each)

Minimum monthly payments, $2.00.

Maximum period of monthly payments, 12 months.

The above prices and monthly payment plan do not include any fixtures.

A Six Pound General Electric Flat Iron
FREE
To Induce the People Owning Unwired Homes to Equip Their Homes for
ELECTRIC SERVICE
WE OFFER
A 6 Pound G. E. Electric Iron
FREE
The cost of living is constantly increasing.
The cost of electric-service is constantly decreasing.
The more customers—the more widely electricity is used—The cheaper the rate.
PITTSFIELD ELECTRIC COMPANY
PHONE 947

Advertisement of Pittsfield Company

Central Station Arranges Educational Lectures for Women's Clubs.

The New York City Federation of Women's Clubs has just announced an interesting course of free lectures to be given under the auspices of the Home Economics Committee. The course runs until the end of April and all of the lectures are to be held at the New York Edison Company's Bureau of Home Economics. On March 9, Mrs. Lily Haxworth Wallace, president of the National Associated Clubs of Domestic Science, talked on "Foods." On March 23, Mrs. Ray Balderston of Teacher's College, will talk about "Laundry Methods." The following Thursday, March 30, Dr. O. M. Leisser of the New York City Board of Health, will speak about "Beauty Hints and Patent Medicines." Mrs. Claudia Quigley Murphy, consultant in Home Economics, will discuss "Home Decoration" on the afternoon of Thursday, April 13, and Miss Helen L. Johnson, chairman of Home Economics General Federation of Women's Clubs, will speak on "Home Economics" on Thursday afternoon, April 27.

All of these subjects will be treated from a viewpoint of the latest developments and applications of electricity. The two which have already been held were largely attended and give promise of the popularity of the ones to come. After each lecture ten minutes is given to discussion followed by demonstrations and tea. The lectures were arranged by Mrs. Eugene J. Grant, president of the Federation of Women's Clubs, Mrs. Charles D. Hirst, chairman of the Home Economics' Committee, and Miss Ann Broome, manager of the Bureau of Home Economics of the New York Edison Company.

San Diego Utility Commended for Quick Work.

The San Diego Consolidated Gas & Electric Company has been commended by press and public for its remarkably quick work in restoring service after the recent floods in southern California. The San Diego *Herald* said:

"The prompt work of the public utilities companies in restoring their service after the recent flood should be a lesson to our city and county officials, who are still wondering where is the best place to begin the work of reconstruction. The Gas and Electric Company surpassed all the others in quick action; they were the first to replace their service in all the outlying sections, and within three days had mains and lines all restored, except that section which supplies Tia Juana."

Joplin Company Fosters Civic Pride

The Empire District Electric Company, Joplin, Mo., which recently prepared and published for free distribution a pocket map of Joplin, has recently added another item to its literature advertising that city. This is a card, bearing facts about the district and a few pointed suggestions for community activity, closing as follows:

"The motto of every man, woman and child in the district should be:

"I live in the district.

"I talk the district.

"I am the district.

"Pull together—awaken public spirit for a bigger, better, busier, brighter district."

Co-operative Advertising in Boston.

An entire Electrical Page was a feature of the *Boston Journal* of February 24, when leading manufacturers and contractors took advantage of the opportunity to set forth their specialties, the Boston Edison Company occupying a liberal amount of space.

Electric Piano As a Field For Central Stations

Correlated Action on Part of Manufacturers and Utility Companies to Extend the Use of Electrically Operated Instrument—Load of 200,000 Horsepower Predicted

Concerted action to bring the merits of the electrically driven player-piano to the attention of the public is being made by the manufacturers of the instruments and recently the co-operation of the central-station industry has been secured through the Commercial Section of the National Electric Light Association. In an address made recently before the New York Electrical Society, Elmer A. Sperry, president, presented some interesting statistics which convey an idea of the enormous field for the sale of central-station energy if only a reasonable percentage of the number of pianos now in use were converted to electric operation. On the basis of one-tenth-horsepower motor for each piano, an ultimate load of 200,000 horsepower is available, when it is considered that there are at least 2,000,000 pianos used in districts now served by central-station lines.

To further the commercial exploitation of the electrically driven player-piano, as well as electrically operated talking machine, the National Electric Piano Makers' Organization Committee has been formed in New York City and on February 10 held a meeting at the Engineering Societies Building at which officials of the Commercial Section of the National Electric Light Association attended. It is the purpose of this organization to induce central-station companies to arrange for a display of the electrically driven player-piano in every central-station electric shop or display room. Referring to the possibilities in this direction an official of the piano manufacturers' organization stated that "every central-station should have on exhibition one or more examples of the several types of electrically driven player-pianos, or installable electric-player actions or electric-player devices that are going to prove to be real revenue produces for the electric light companies. The very purpose of the display rooms maintained at great expense by the electric light companies is to indelibly impress upon the mind of the public, in a given locality, the manifold uses of electric current in the home and surely the electrically driven player-piano represents the highest and most esthetic employment of electric energy.

"Another respect in which the electrical interests can further the sale and distribution of electrically driven player-pianos, and in so doing increase the public use of energy, is in advocating that use in their "house organs," which the electric-lighting company of each and every city publishes, and in illustrating the patent advantages of the electrically driven instrument over the foot-operated player of old.

If they were to call the attention of the public, for example, to the sostenuto effects that may be had from the hand-cut music roll when that roll is inserted in an electrically driven instrument and played by the mere turn of a switch they would show the tremendous advance which the electrically driven instrument has made upon the old-time player with its machine-cut rolls."

To further bring the electrically driven player-piano to the attention of the public through the medium of central stations, the piano manufacturers suggest that under their joint auspices concert demonstrations can be held in the various central-station show rooms.

That the central-station industry should take cognizance of the opportunity offered by the electric player-piano is the opinion of officials of the Commercial Section who have looked into the possibilities. It has been stated by prominent members of the National Electric Light Association that the action taken by the Commercial Section Executive Committee, in bringing the electrically operated instrument to the attention of the central-station interests in a most favorable light, would develop the featuring of the instrument by individual electric light and power companies under varying circumstances and conditions.

In certain instances a company would welcome the placing of one or more instruments in its local display room, and might even undertake the sale of instruments upon a commission basis, while in other instances the instruments would be incorporated in local electric light shows, in "electrical prosperity weeks" and like celebrations arranged to increase popular and local interest in the acquirement and use of electrical apparatus and devices, in which classification, of course, electrical players and talking-machines come.

In every instance the manager or technical assistant of a piano wareroom may call upon the local central-station company for the fullest advice and assistance in the working out of any minor problem as to current or of the superficial repair of motors, storage batteries or other electrical apparatus incorporated in a piano or talking-machine and for the "coaching" of salesmen in the elementary principles of electricity that enter into the sale of an instrument and its installation in a home that may, or may not, be already wired for electric service.

Correlated action on the part of the manufacturers and utilities seems to be assured.

The importance of the new art of the electrically driven player-piano is not at all appreciated. It might be said that the entire piano industry is now devoting its attention and energies to the subject.

On the assumption that there are 300,000 pianos made yearly in this country, a figure which is somewhere near the actual fact, and that the average piano remains in use at least ten or fifteen years, it will be seen that there are some four million pianos in actual service in the United States at the present moment.

Assuming that only half the population of the country is within reach of central-station circuits, it appears at once that at least two million pianos could be electrified.

Going one step further and allowing that each piano requires a motor of about one-tenth horsepower, and the average may be higher, this would represent a possible demand for 200,000 horsepower of central-station energy at some time during the day, steadily for two or three hours at a time.

Such a new demand is not to be despised, and this is one reason why the Commercial Section of the National Electric Light Association has been investigating the subject, with the idea, I am informed, of placing an electrically driven player-piano in every electrical showroom in the country. The subject, however, goes far beyond this, and interests the entire industry, not only in its electrical and scientific aspects, but because of the enormous new demand that it opens up for motors, switches, wires, control apparatus, and other elements and apparatus.—From an address by Elmer A. Sperry, president of the New York Electrical Society.

POWER ENGINEERING

Problems Involving Motor Applications, Machine Characteristics, Power Sales Methods and Industrial Electric Heating

ANOTHER ANGLE ON THE WOOD-WASTE PROBLEM.

Factors to Be Considered by the Power Engineer.

Waste in a woodworking plant as a rule is listed by the power salesman as an insurmountable obstacle to a contract for central-station service. Generally, perhaps, the conclusion is unavoidable. The old problem looms as large as ever, and the man who can solve it will find a waiting welcome. Still it does not follow by any means that the sawdust pile and the heap of chunks constitute an impassable barrier in every case. In fact, the wise power salesman will consider each instance by itself and will investigate each plant as an individual proposition.

Take, for instance, the large number of dimension mills which cut rough lumber to sizes. Furniture factories, vehicle plants, etc., come under this classification. The waste here will ordinarily be more in the way of butts, chunks, ends, and slivers than of sawdust. That such concerns are practicable prospects for the central-station power salesman, can be shown by citing the experience of a certain Middle Western concern.

This is a dimension mill which is an adjunct of a large sawmill, working largely in imported timber. Much of the lumber produced is of lower grades, of course, and, in the board-measure market, would have brought unprofitable prices. In order to market this lumber as advantageously as possible the dimension mill was established. It works in kiln-dried lumber, and turns out pieces cut to more or less standard dimensions, for which there is a large and ready market.

For the first few years the company, directed by mill men who had always found it necessary to burn the waste in order to dispose of it, continued to throw this into the furnace. Occasionally calls for such fuel came in. Peddlers got to buying it and retailing it for kindling or fire wood. Little by little this trade grew and eventually the company adopted the policy of selling all the marketable waste and supplementing the sawdust and small scrap fuel with coal. Now this plant, selling the bulk of its waste, operates almost wholly on coal.

It is situated in a city of 300,000 or so and there is a considerable demand for the dried wood from the bakers who operate on the old basis and from householders who prefer wood for open fires or stoves. So, for some time now, the plant has been operated wholly on coal, except for the slight waste. And the system is being handled profitably, with a credit over and above the cost of the coal of from $350 to $500 a year. Besides this, the superior efficiency of the coal under the furnace, concentration of the fuel and greater ease of operating are additional advantages.

Of course this is a case where the market was present to take care of the waste—an essential condition. But the chances all the way along are that such a mill or a factory working in seasoned lumber would be located where there would be a market. In any event the likelihood of a market for a commodity of this kind being developed is usually good enough to justify at least a careful inquiry into the situation.

Should it develop that the mill management finds it can profitably dispose of its waste in such a manner and resort to coal for its fuel, that leaves the power salesman with a straightforward proposition. He has then a plant which is using steam, or by steam generating its own power, and a proposition of that kind has no terrors for the average power salesman.

Wood Waste in Sawmills.

Working around to the common, ordinary, garden variety of sawmill, cutting up logs into slabs, sawdust and commercial lumber, the proposition is quite different. Here the waste assumes a more serious aspect, because it is larger in proportion to the finished product of the plant. There are the big slabs with the bark on, the ends of the boards and the tremendous volume of sawdust. And, to make it worse from the point of view of finding a market, this waste, like the lumber, is often not only sappy and green but also water soaked from rain or long days of rafting down the streams.

No need to tell the power salesman, however, that getting rid of this waste is the first problem to be solved. Too many of them have lain awake nights trying to find the answer as to how to convert this waste into a marketable product and how at the same time to cash in on the idea. Not to suggest that this problem is not the biggest one nor to offer a practicable solution, it may be suggested, however, that sometimes the mere heaps of waste have been considered in themselves sufficient to stop the salesman when in fact the prospect was ready to consider central-station service.

Several agents or conditions favor the power salesman in the cases of sawmills which utilize their waste as a matter of course. In the sawmill department of the concern heretofore referred to, a typical state of affairs is disclosed. A large volume of timber is handled annually, with a propor-

TALKS TO POWER SALESMEN.

"Talks to Power Salesmen" is the subject of a series of three articles by C. H. Stevens, manager of the Power Bureau of the Edison Electric Illuminating Company, of Brooklyn, which will be started in our next issue. Mr. Stevens has organized one of the most comprehensive departments for the acquisition of power business known to the industry and the success of the Brooklyn company in building up such a creditable power load is largely attributed to the efficiency of this bureau. Mr. Stevens will explain the organization and operations of this department and give power salesmen and engineers much valuable information, based on his wide experience in securing difficult contracts. The initial article will deal with the "Equipment of the Salesman."

tionately large volume of waste. The sawdust and the bulk of the slabs are mechanically conveyed to the furnaces which reduce them to ashes, for which there is generally a ready market, at least at a price which will get rid of them.

But the management of this property is convinced that it costs, in the way of heat and material consumed, as much to rid the waste of its sap and its water so that it will burn readily, as the resultant readily burning fuel is worth. Another way to state the proposition is that the whole volume of waste, considered as fuel, is only 50 per cent efficient. And there are times when it is necessary, in order to keep the steam up, to burn coal in the furnaces along with the sodden waste.

It means that the net efficiency of this waste, used as fuel, is low indeed. Coal or coke as poor in efficiency could not be given away.

Disposal of Refuse Capable of Solution.

For a long time the tanneries were classed among the forlorn hopes. They burned the tan bark under their boilers, to get rid of it, in the same way that the sawmills and woodworking plants are in a large measure doing now. The lead-mining and refining interests found a use for the bark and a tannery nowadays is an excellent prospect for the power salesman. The big, unconquered industry is nowadays the woodworking industry. That it would much prefer the electric drive is shown by the number of woodworking establishments which are putting in isolated plants.

These things being true, it follows that where a market to take the waste, even at cost of the substitute fuel, can be developed, central-station power service ought to appeal strongly to the mill owner. It could be figured in more than a few cases, that his profit would be an indirect one, through reduction of his investment in a power plant unduly large, because of the inefficient fuel. So to sell a woodworking concern it should not be necessary to have to show how the waste could be disposed of at a profit.

Referring to the dimension-stock mill cited above, it was stated by the management that even if the receipts for the waste sold did no more than almost equal the cost of the coal purchased for fuel the method of selling the waste and buying the coal would be preferred. With testimony such as this there is reason for the power salesmen to take heart.

The situation as to the use of waste for fuel is not the forlorn hope that it is sometimes represented to be. The methods in general use plague the woodworkers as much as they challenge the power salesmen. Mill owners themselves are keen to find ways of disposing of this waste other than by burning it in their power plants.

And the writer has been endeavoring to show here that the conditions more or less general as this time are such as to furnish the power salesman with a good toe-hold. He can use the information relating to the handicaps of waste as fuel as an entering wedge to what some day will be a big electricity-buying industry. It is a question only of a probably limited time until some ingenious lumberman, electricity salesman or other person comes forward with a practicable solution, at least in part.

Meanwhile each mill stands on its own bottom. The solution in each case is almost sure to be an individual one. Generally there is not a great deal of similarity between the character, extent and possible market of any one or more mills. And it should not always be necessary that the power salesman present the mill owner with a complete solution to the waste problem. A part-way solution might very readily be finished out by inclusion of the disadvantages to the mill owner which attend his efforts to utilize his waste as fuel.

This much is probably true. The best lead to the contracts which will be written with mill owners after some generally applicable solution of the wood-waste problem is found, is very likely to be through the boiler room of the plant owner. Until then there are likely to be many chances for business when the salesman approaches his prospect along these lines.

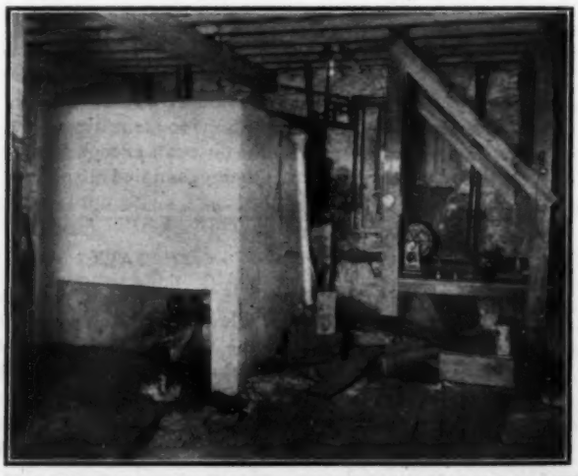
Quarter-Horsepower Motor Saves $25 Per Month for Swimming Pool.

In Leavenworth, Kans., the Y. M. C. A. operates a popular swimming pool, and heretofore the water has been purified by allowing a stream of fresh water to flow into the tank, the overflow emptying into a sewer. The cost for the water under this system amounted to approximately $480 for 12 months. Under these conditions the Y. M. C. A. decided to discontinue the use of the pool during the winter.

In co-operation with the commercial department of the Leavenworth Light, Heat & Power Company, arrangements were made to install a filtering system whereby the overflow could be again used. Accordingly a one-quarter-horsepower motor operating a pump was installed for returning the water from a concrete settling tank back to the pool. This arrangement has proved entirely satisfactory and the cost has been reduced to $120 a year.

This is a novel and interesting application of electricity which is worth the attention of all central-station commercial managers for in almost every city there are several swimming pools in operation throughout the entire year and the opportunity for installing purifying equipment is appealing as well as economical in operation.

A 0.25-Horsepower Motor Pumps Overflow Back Into Tank.



Motor-Driven Pump Which Saves $25 Per Month in Water Bill.

Muskogee Company Gives Quick Service in Emergency.

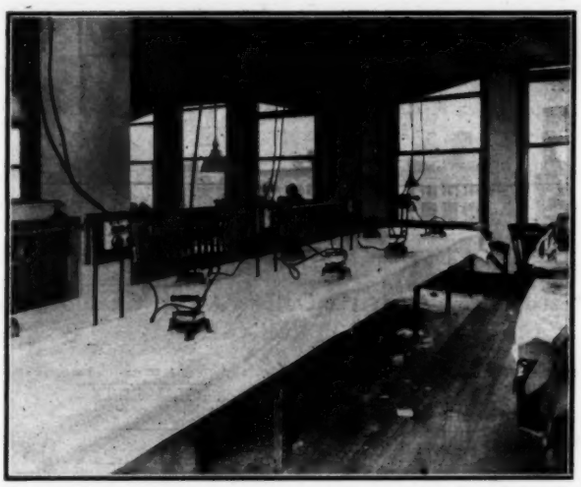
February 3 a fire destroyed the general shop building of the Midland Valley Railroad Company in Muskogee, Okla. The next morning application was made to the Muskogee Gas & Electric Company for temporary service. In order to do so it was necessary for the company to make a 2,000-foot extension of the electric distribution system and set seven poles. At 7 p. m., February 4, all work had been completed and service established for a ten-horsepower motor to operate the coal chutes and a 7.5-horsepower motor in the woodworking shop. A 40-horsepower motor was installed later for operation of the machine shop. It is probable a permanent contract will be secured.

Tobacco Company Uses Central-Station Service.

A contract has been signed by the Louisville Gas & Electric Company, with the Axton-Fisher Tobacco Company, Louisville, by which the tobacco company is putting on an additional load of 75 horsepower. Ordinarily tobacco handling establishments are closed doors to central-station salesmen for the reason that steam is an indispensable requisite to the manufacture of tobacco. The leaf must be moist in order not to shatter in the handling. The Axton-Fisher Company is not throwing out its isolated plant, but is supplementing the power from it. Rather than increase the steam and generating equipment which would be necessary in view of the rate at which the business of the concern is increasing, the company is turning to central-station service. It is an alternating-current plant throughout.

Increased Use of Electricity in Garment Trade.

Some interesting figures in connection with heating installations for industrial uses have been collected by the Heating Bureau of the New York Edison Company. The yearly report showed a gain in the number of articles installed of more than 20 per cent, and a gain in 50-watt equivalents of approximately 20 per cent. These figures, however, do not adequately represent the increased load on the lines when electric heating is being judged as a revenue producer. The reason is that the average heating appliance in commercial use is in service many more hours a day than an equal installation in lights. To prove this, an investigation was made of representative installations.

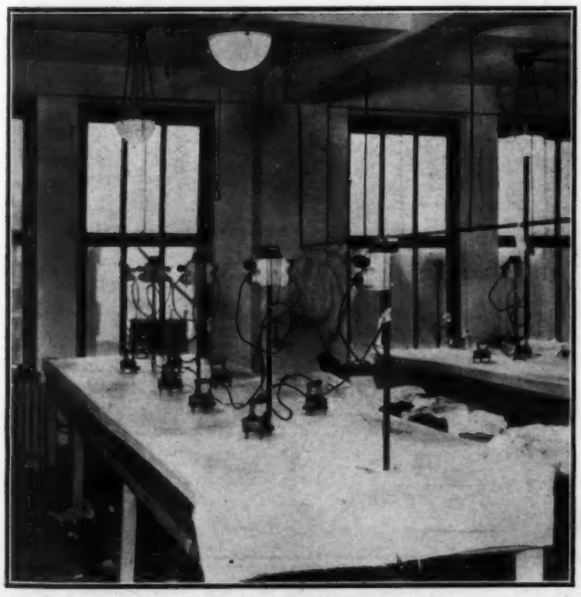


This Customer's Bills Average $486 Per Year for Ironing.

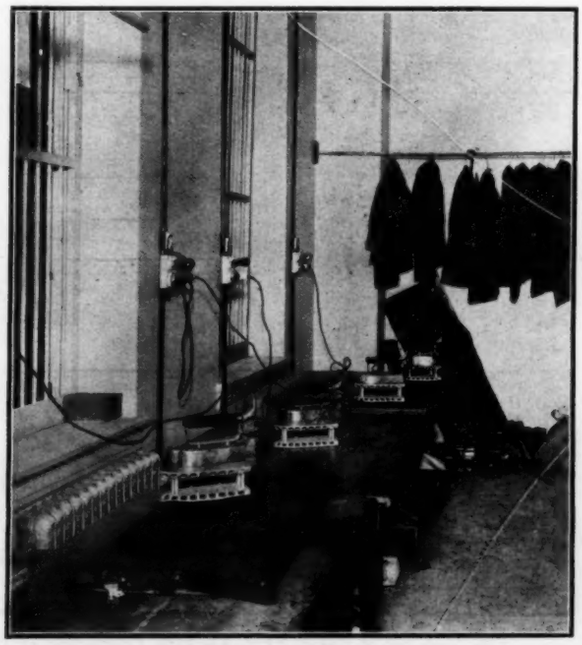
A study was made of eight flat iron installations by C. N. Lewis, manager of the Heating Bureau. These eight installations totaled 105 irons which consumed 67,659 kilowatt-hours for the year, representing an average yearly consumption of 644 kilowatt-hours per iron, or an income at an eight-cent rate of $51.52 an iron per year.

The first case was a cloak and suit manufacturer with an equipment of 20 Simplex irons of the 770-watt type. By actual meter readings this installation for 1915 brought in a return (at a five-cent rate) of $1,113.15 to the company. Case No. 2 was a fashionable men's tailoring establishment on Fifth Avenue. Here 13 General Electric flat irons produced $402.75. A "waist house" using 18 six-pound Reimers irons was tested, this being a type consuming only half as much current as the irons used by the tailor; the company's annual income here was $486.36. Another "shirtwaist house" using 24 of this lighter iron consumed $750.72 worth of current.

As New York is the center of the garment trade for the United States, it can easily be seen that this is an extensive and lucrative field.



Iron Installation in Waist Factory.



Iron Installation in Garment Factory.

ELECTRICAL CONSTRUCTION

A Department Devoted to Problems Relating to the Installation, Operation and Maintenance of Electrical Equipment

WIRING OF A RAILROAD PASSENGER SERVICE TERMINAL.

Passenger Service Station, Coach Yard and Locomotive Roundhouse of the Baltimore & Ohio Chicago Terminal Railroad.

Even though but a relatively small percentage of the total railroad mileage of this country has been electrified, it is not generally known to what a large extent the steam railroads are using electricity, particularly in the service of their passenger departments. Opportunities for the electrical industry to interest itself in this development are steadily increasing. The installation of the necessary electrical equipment for a steam railroad terminal, for instance, requires special study and skill on the part of the electrical contractor, who must really be also an electrical engineer of no mean ability. Many special problems and requirements must be met and the electrical firm that can successfully execute such a contract proves itself capable of handling the most difficult jobs.

An installation of this type recently completed is in the new passenger service station, coach yard and roundhouse of the Baltimore & Ohio Chicago Terminal Railroad, which is located along Fourteenth Street, between Robey and Wood Streets, Chicago. This service terminal is used by the five railroads which enter the Grand Central Station, and it was built because the old passenger yard had to be abandoned because of necessary trackage and freight-house rearrangements necessitated by building the new Union Station. The entire installation was put into service shortly before the close of last year.

Power House.

As considerable steam is needed for heating the service buildings, shops, roundhouse and the cars in the coach yard, a power house was provided for developing the necessary steam and also generating electric current for lighting, power and battery charging. In this power house there are three main generators, two exciters, two steam-driven air compressors, pumps and various auxiliaries. The three generators are each rated at 150 kilowatts, three phase, 440 volts, 60 cycles. They were furnished by the Western Electric Company and are individually driven by Ridgway Corliss engines. Of exciters there are two, both of which were originally Curtis turbine-

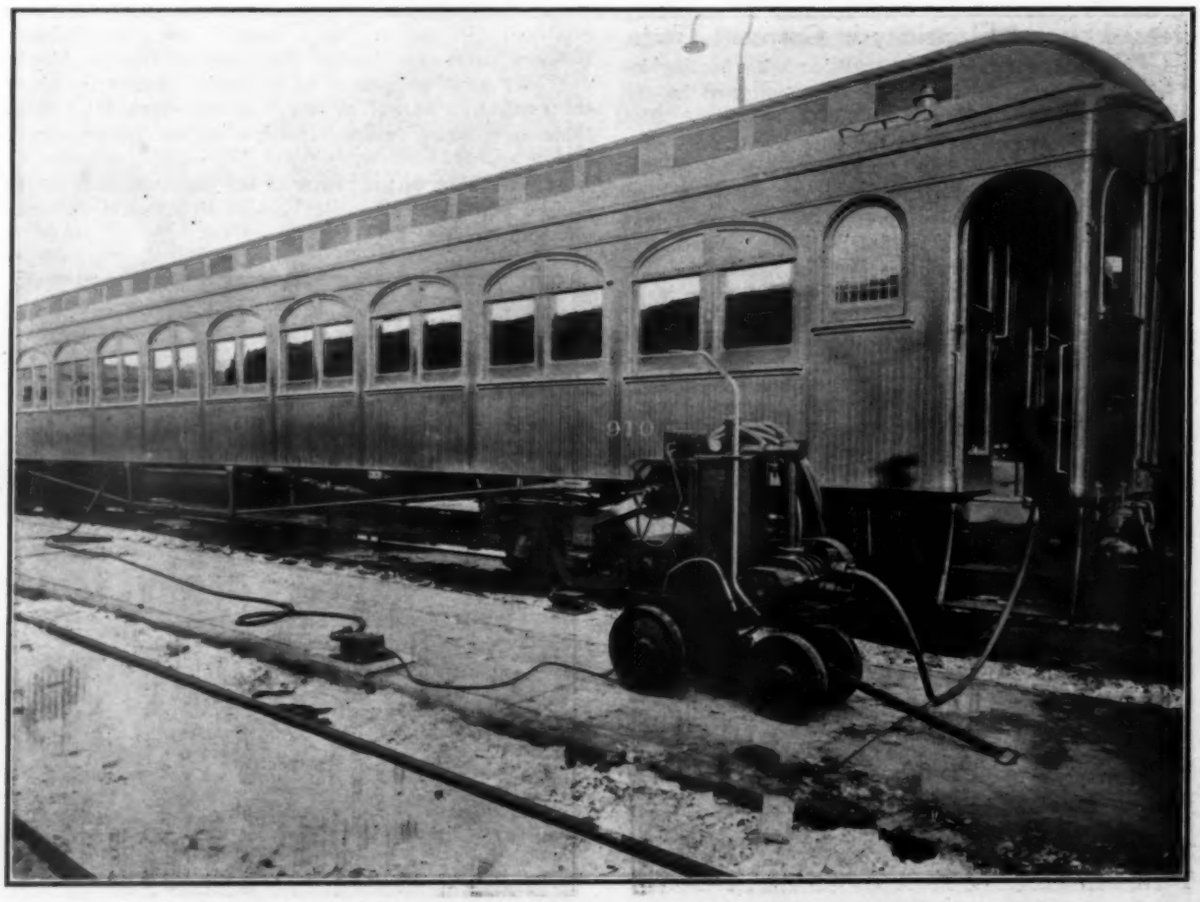


Fig. 1.—View in Coach Yard, Showing Connection of Charging and Vacuum-Cleaner Cables to Yard Receptacles.

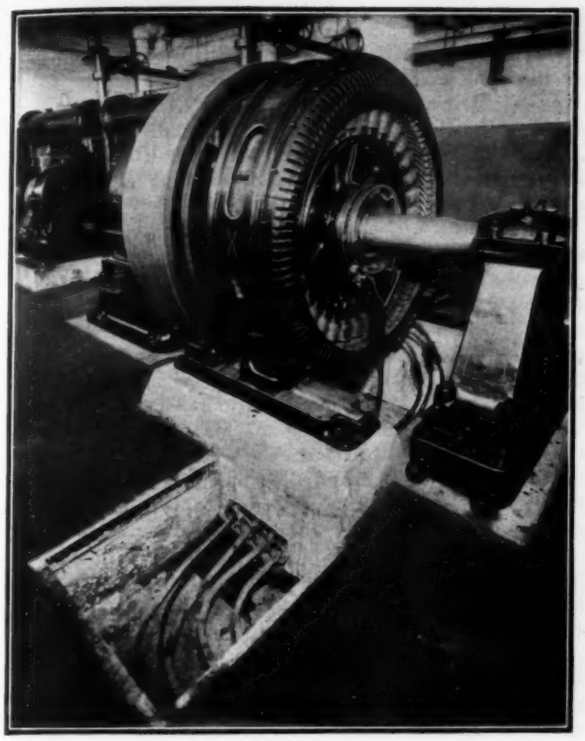


Fig. 2.—One of the Alternators in Power House, Showing Manner of Running Leads to Switchboard.

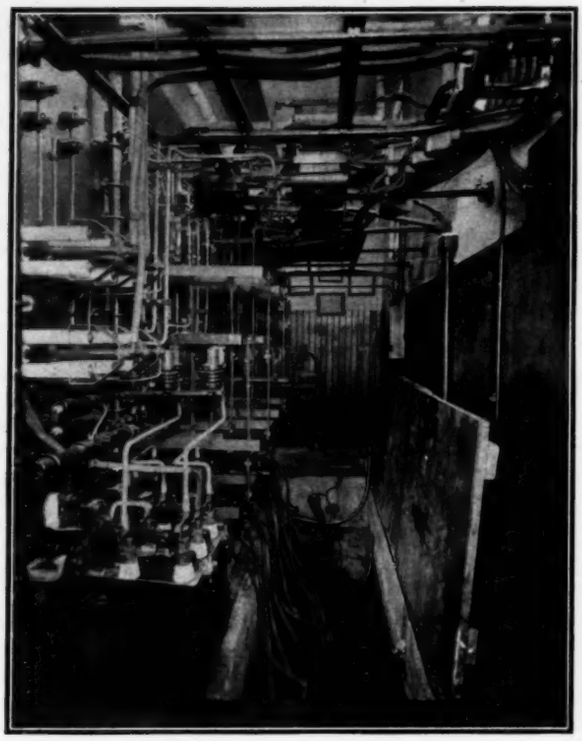


Fig. 4.—Rear View of Main Switchboard with Floor Sections Raised to Show Cable Pit.

driven, 20-kilowatt, 110-volt, direct-current units operating direct-connected at 4,500 revolutions per minute. One of these units has since been replaced by a motor-generator set which was being connected up when the photographs for the accompanying illustrations were being taken.

One of the main alternators is shown in Fig. 2. This also shows the manner in which the leads from the generator are carried to the switchboard. These run through the generator pit in iron conduit and then pass through ducts in the generator foundation pedestal to a convenient handhole in the floor shown in the foreground with its iron cover removed; from here they pass in ducts under the floor, under and back of the switchboard. Lead-covered cable is used for the duct portions of the main and field conductors. The cable lugs joining them to the generator terminals are protected by fiber sleeves entirely covering the lugs.

At the back of the switchboard there is a concrete-lined pit covered by three plank trap doors. In Fig. 4 these are shown raised against the wall. Into this pit run the lead-covered cables from the generators and exciters and here they are distributed to their proper connections at the rear lower part of the switchboard. The motor-driven exciter was being connected up at the time the photograph was taken. In the upper part of this view are eight horizontal pipes which serve both to brace the top of the board from the wall and at the same time to support iron cross bars on which are mounted current transformers and the outgoing lighting and power feeder cables. These cables are nearly all covered with loom to the point of their entrance through Unilet terminal fittings to the outgoing conduits. As can be seen in the upper right corner, most of these conduits bend upward, while a few run straight down to underground feeders. The two cabinets on the right wall are for power-

Fig. 3.—Front View of Main Switchboard in Power House.

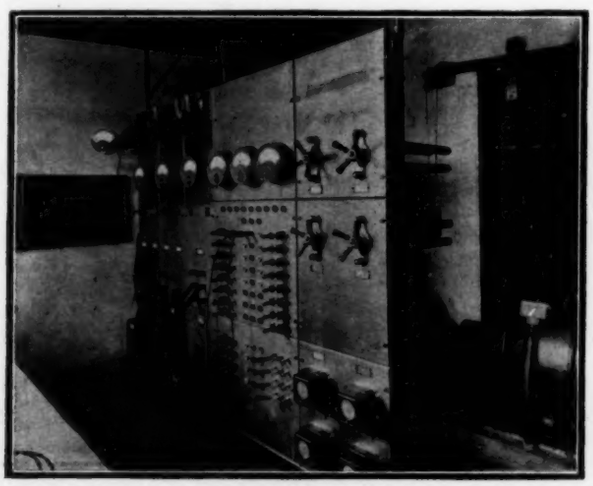


Fig. 5.—Front View of Charging Board in Battery Room.

house lighting and small-motor circuits in and close to the engine room.

Space does not permit going into the details of the switchboard wiring. Two sets of 440-volt, three-phase busbars are provided, to either of which any generator or main feeder can be connected; thus it is possible to segregate the lighting and power loads or obtain other desired load distribution. There are also two sets of exciter buses; either exciter may be connected to either of these buses and any of the three alternators may be connected to either exciter bus.

Fig. 3 is a front view of the switchboard. The first panel controls the exciters; the next three panels are for the main generators; then there are two panels for the eight principal lighting and power feeders, each of which has a watt-hour meter for measuring the output to the various departments; the last panel at the right is for the series lighting system of the coach and locomotive yards. The constant-current regulating transformer for the latter can be seen to the right of the board. Secured to the left end of the board are the usual swinging indicating instruments and below these is attached a panel for the Tirrill field-current regulator. Immediately to the left of this is the autostarter for the motor of the motor-generator exciter, the top of which can be seen in hazy outline in the middle foreground of the illustration. In the corner back of the series lighting regulator, but not shown in the illustration, is a single-phase, step-down transformer for the 110-220-volt, three-wire, multiple lighting system used throughout the buildings.

Battery Room.

In the same brick and concrete building which includes the power house at the west end are various offices, shops and supply rooms for taking care of the cleaning, the provisioning and ordinary maintenance of the passenger coaches. The building which houses these various service departments is about one-eighth mile long and two stories high. From the electrical standpoint, one of its most interesting sections is what is known as the battery room. It takes care of the charging and any special maintenance of the car-lighting storage batteries with which practically all of the passenger cars using the yard are provided. Most of the cars have axle-driven lighting equipments including either a 32 or 64-volt battery, which should normally be fully charged when entering the yard. Due to a loose belt or other cause, a battery with a low state of charge is occasionally found. Some of the cars have other lighting systems, such as the straight storage system, whose batteries need regular charging. For this purpose, a somewhat elaborate charging system is provided which is energized from the battery room referred to through underground circuits reaching close to the cars so as to avoid the removing of the batteries therefrom. Into the battery room are actually brought only such batteries as need more or less complete overhauling. Repairs to other parts of the car-lighting equipment are also made here.

For furnishing the direct current for battery charging, there is in the room adjoining the battery room, a motor-generator set comprising a 50-horsepower, three-phase, 440-volt induction motor, direct-connected to two 15-kilowatt, 55-volt, direct-current generators. Fig. 5 shows the front view of the battery-charging switchboard and a partial view of this motor-generator. Fig. 6 gives a better idea of this set and also shows the back of the board. The method of running the machine leads into conduit through Unilets is clearly shown. The motor switch cabinet with door opened and the autostarter can be seen at the rear in Fig. 6. In this switch cabinet there are also current transformers for the watt-hour meter that measures the motor load.

This meter is mounted at the bottom of the first switchboard panel (Fig. 5); the remainder of this panel controls one of the direct-current generators. The second panel controls the other generator and also has a switch for connecting the two machines in series in case more than 50 volts is needed on any charging circuit. Normally the two generators have a common negative bus. A special circuit from the exciters in the power house terminates at the third panel; this is arranged to furnish a source of direct current to the charging board in case the motor-generator set might be out of commission; a watt-hour meter will be installed on this circuit to measure any energy so used. The fourth panel contains three direct-current ammeters and a system of switches and plugs by means of which any of the charging circuits can be connected to either positive bus and the current in it can be measured and the total charge determined by one of the four Sangamo ampere-hour meters shown at the lower right corner of the board. For regulating the current on the several charging circuits, four Allen-Bradley compression rheostats, each consisting of four rods, are mounted on the upper part of the last panel. Inclosed knife-blade-type fuses for the outgoing circuits are mounted in the cabinet at the rear base of the board. A small panel to permit charging batteries in this room will probably be added in the near future. The circuit layout of this board is quite special and its details cannot be gone into in the limits of a brief general article.

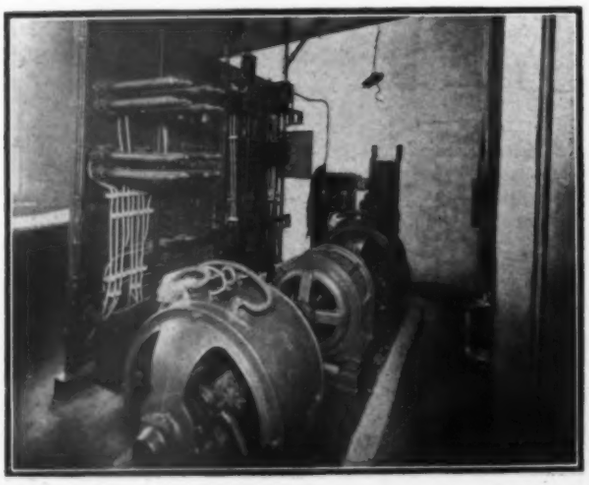


Fig. 6.—Rear View of Charging Board and Motor-Generator Charging Set.

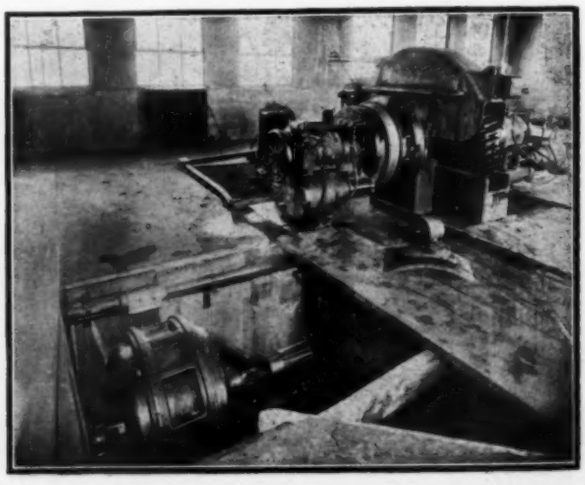


Fig. 7.—Fifty-Horsepower Motor in Pit for Driving Car-Wheel Lathe.

Coach-Yard Circuits.

The coach yard contains 33 tracks grouped in pairs with a concrete walk between pairs. The charging circuits run underground from the battery room in multiple vitrified-clay ducts to midway between tracks 16 and 17 and then south between them along the length of the yard. From this main duct line there are branched off five laterals running in fiber duct east and west across the tracks. A manhole is provided at the junction of each lateral with the main duct. From the laterals there are tapped off short branches to yard receptacles adjoining the various tracks. These receptacles, of which 99 have been installed, are spaced not over 150 feet, or less than two car lengths, apart along the track, so that it is easy to reach any car throughout the yard by flexible extension cables that need not be over 50 feet long.

There are ten independent charging circuits with a common negative return. The positive leads are No. 2 wires running from the cutout cabinet at the back of the battery-room switchboard through the duct lines and manholes and branching off to the ten laterals referred to. The negative lead consists of two 500,000-circular-mil cables from the common negative bus to the first manhole, then it tapers down through the other three manholes of the main duct line. The ten negative laterals tap off from these main cables in G. & W. underground boxes in the manholes where each lateral is fused. Testing and switching terminals are also provided for the positive laterals where they pass through these boxes.

For the vacuum-cleaner circuit there is a transformer that steps down one phase of the 440-volt supply to 220 volts. From this the cables run to and through the main duct just described. Both sides of each of the ten laterals are fused with a 60-ampere cartridge fuse in the G. & W. boxes in the manholes. All the underground conductors, both for the charging and cleaner circuits, are lead-covered, rubber-insulated cables.

Fig. 1 makes clear the general location and manner of using the special yard receptacles. They are usually installed in pairs at the edges of the walks between pairs of tracks. At the further end of each combination receptacle housing is a 100-ampere receptacle for the battery-charging circuit; at the nearer end is a 220-volt receptacle for the vacuum-cleaner circuit. Each receptacle has a steel guide shell just within the opening which fits a corresponding part of the plug and thereby removes all mechanical strain from the electrical contacts which are concentric and set in a recess a little back of the opening. These openings are protected by spring covers and the entire device is completely weatherproof. The receptacles are easily wired. They were furnished, as also their corresponding plugs, by the Albert & J. M. Anderson Manufacturing Company.

The cable at the left in Fig. 1 shows how the connection to the car battery receptacle is made, although no actual connection was made when the photograph was taken. The cable at the right connects with the portable vacuum-cleaner set, on which is mounted a cable reel with enough cable on it to permit the outfit to be placed, if necessary, about one car length from the yard receptacle. At the request of the city electrical inspector, the plugs at the receptacle end of these cables will be provided with 10 or 15-ampere double-pole cartridge fuses, to protect the cable reel on the machine. A short length of armored cable runs from the reel to the motor switch, which is in a cabinet above the reel. The plug connecting with the reel end of this latter cable is arranged so that it must be removed to permit the reel to be turned; when it is plugged into the side receptacle on the reel it automatically locks the latter against turning. The motor on the machine is a 1.5-horsepower, 220-volt Wagner single-phase induction motor. Sufficient hose is provided to reach any part of the car. Various tools are also included in the outfit, which is known as the Arco Wand vacuum cleaner and is manufactured by the American Radiator Company. Five of these sets are now in successful use in this yard; more will probably be added.

Motor Installation.

In the various shops connected with the service building and also in the roundhouse, there are quite a number of motors, all of which are 440-volt, three-phase machines. Their installation is made in the customary way, but some of them are worthy of special mention. In Fig. 7 is shown a car-wheel lathe which is driven by a 50-horsepower motor installed in the pit. The controller for this machine is located near the opposite wall and is connected to the motor by means of 2.5-inch conduit which is clearly noticeable in the picture. The wiring at the controller was temporary, as was the motor, when the picture was taken; a three-phase slip-ring motor arranged for variable speed will be substituted. Directly above the motor can be seen a special Unilet fitting from which the numerous primary and secondary wires of the motor lead to the machine. The supply wires pass through the conduit at the left and run to the controller along with the other wires. This motor drives a machine for truing up car wheels with slightly flattened portions; this saves hauling the car to the rather remote general repair shops of the respective railroads. There is also an auxiliary five-horse-

Fig. 8.—Duplicate Set of Motor-Driven Centrifugal Pumps in Roundhouse.

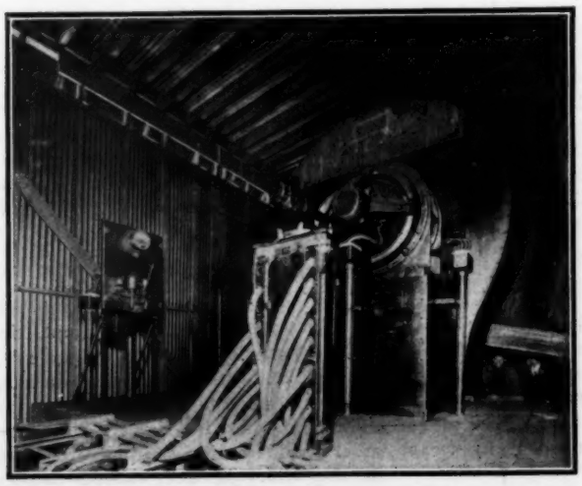


Fig. 9.—100-Horsepower Motor Driving Smoke-Exhaust Fan on Top of Roundhouse.

power motor in this equipment. In the service building there are also two electric freight elevators supplied by the Otis Elevator Company. In the carpenter shop a motor for operating some woodworking tools will probably soon be installed.

The locomotive roundhouse, which occupies the northwestern portion of the property, contains a number of interesting motor installations. One of these is shown in Fig. 8. This is a duplicate motor-driven centrifugal-pump set. In each unit there is a 10-horsepower induction motor. These pumps are installed for the purpose of supplying water to the large tanks that feed the locomotives, if the city water pressure is insufficient to bring the water to this considerable height. The motors can be controlled manually from the cabinet on the wall or automatically by means of a float switch associated with the tank.

On top of the roundhouse is a long smoke flue which is connected to the short uptakes for each locomotive stack and serves to prevent the smoke from leaking into the roundhouse and conducts it to a large brick stack about 200 feet high. In order to provide a positive draft for this large smoke flue, there is a duplicate installation of suction blowers, each driven by a 100-horsepower variable-speed induction motor. A view of one of these sets is shown in Fig. 9. The diameter of the blades of this blower is about 10 feet. The motor is mounted on a substantial pedestal, secured to which are the heavy three-inch conduits carrying the primary and secondary leads. An oil starting switch and an ammeter are mounted in a panel at the left. In the middle of the picture can be seen the rear of the controller which can be used in accelerating the motor and in regulating its speed through changing the secondary resistance. The heavy leads from this controller are run to a mass of iron resistance grids, only a small portion of which can be seen in the lower left corner. These cables are supported by means of porcelain cleats and are protected where they come in contact with each other by flexible tubing. This entire motor and blower is mounted in a corrugated-iron housing on top of the roundhouse and is thoroughly ventilated and at the same time fairly well protected against the weather.

A large elevated coaling station is also an auxiliary to the roundhouse for which there is a coal hoist operated by a 25-horsepower induction motor. The turntable just outside the roundhouse is electrically operated through a 20-horsepower Westinghouse induction motor of the slip-ring type. The control cab for this motor is at one end of the turntable so that the operator can observe the exact alinement of the tracks. This motor is supplied with current from an overhead three-phase line through a special feed box mounted on a light bridge over the middle of the turntable. In this box are three contact rings with three stationary brushes bearing against them. The feed wires connect with these brushes and the rings connect with the cable that passes through the axis of the box and then leads in conduit to the motor and controller. The turntable, which is 100 feet in diameter, and its operating machinery were furnished by George P. Nichols & Brother.

Yard and Miscellaneous Lighting.

For the lighting of the coach and locomotive yards there is a special series 6.6-ampere constant-current circuit. On this are 38 400-candlepower Mazda type C lamps. In the coach yard, 22 of these are mounted on iron poles with a gooseneck top and radial reflector, as can be seen directly above the car in Fig. 1. They are supplied from an underground lead-covered-cable circuit, entirely distinct from the charging and vacuum-cleaner duct lines. In the locomotive yard wood poles are used and the distribution is overhead. The lamps are from 30 to 35 feet above the track surface of the yard, which is itself elevated some 16 feet above the street surface.

In the roundhouse, which contains 34 locomotive stalls, there is special lighting for each stall consisting of three lamps with reflectors and vaporproof lamp housings. Conveniently located on each side of the engine are two receptacles for connecting extension cords and inspection lamps. These are equipped with Crouse-Hinds Condulet receptacles. For the general lighting in the various shops, offices, etc., standard 110-volt Mazda lamps equipped with Benjamin porcelain-enameled steel reflectors are used.

With the exception of the main switchboard and switchboard in the battery room, which were furnished and installed by the Cuthbert Electrical Manufacturing Company, all of the electrical installation was put in by the Freeman-Sweet Company, of Chicago. O. B. Shaner is the terminal engineer of the railroad company and R. W. Keyes is the electrician in charge.

Among the Contractors.

The Electric Supply Shops, Great Falls, Mont., has been organized by F. H. Seal, Christ Ousum and Joseph Olson with a capital of $40,000. The concern will do electrical contracting and deal in supplies.

A. A. Bonnard has purchased the interest of D. C. Patterson in the Santa Rosa (Cal.) Electric Company, and with J. B. Kent is now in charge of the business.

The Lord Electric Company, Boston, Mass., has been awarded the contract for the electrical work in connection with the construction of the new State Library, at Montpelier, Vt., the price being $3,990.

The Board of Local Improvements, Streator, Ill., has awarded the contract for constructing the ornamental lighting system for Main and Vermillion Streets to J. W. Gates, Inc., of Streator, on its bid of $10,143.97.

L. M. Turner and C. D. Giddings have formed a partnership and will do electrical contracting and handle supplies at Americus, Ga.

The Standard Electric Company, of Minneapolis, Minn., Fred G. Dustin and Charles W. Arrick, proprietors, moved on March 1 to 239-240 Plymouth Building, where accommodations were obtained to meet the requirements of the company's rapidly growing business.

The Harry I. Wood Company, Louisville, Ky., is working on the following contracts in Louisville: Wiring for light and power in the Home Telephone Company's new exchange; installation of one 35-horsepower and two 20-horsepower motors and feeders for the Ewald Iron Company; complete conduit system for the modern Bonnie six-apartment building; installation of feeders for two 225-kilowatt enameling ovens for the Ford Motor Company. The main feeder will consist of two 1,000,000-circular-mil cables for each leg of the three-phase system, the branch feeders being two 500,000-circular-mil cables.

Keeping Pliers in Order.

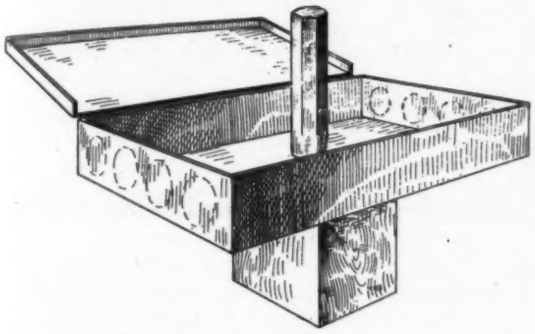
When pliers get to working stiffly through abuse they may be made to work easily again by mixing a little oil and fine emery powder and applying this paste to the joints. Open and close the jaws a number of times to work the paste well into joints, this cutting any dirt, grit and rust that has clogged them. It is surprising how quickly the bind is ground out in this way. Cleanse by flushing with gasoline. J. B. Story.

DOLLAR WIRING KINKS

Every reader is invited to contribute to this page. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Punching Holes in Cutout Cabinets.

It is frequently necessary to provide extra holes in cutout or switch cabinets. The usual plan of drilling such holes may be done away with by the method described below, thus saving much time and hard labor. I locate and mark the hole on the box by scratching a few short

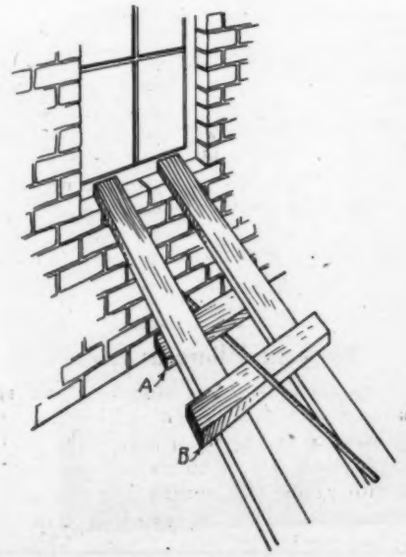


Punching Holes in Cabinets.

lines about it by means of a sharp tool. The box is then placed on a perfectly flat end of a hardwood block. Use a round steel punch with the end ground off squarely. A moderate blow with a hammer will make a clean hole. Be sure to use end grain of block. A. F. Stearns.

Simple Expedient for Conduit Bending.

On new work where conduit above one inch in size is to be bent the following scheme has been found to be very quick and handy in the absence of better facilities. It requires only two planks laid with one end resting on a window sill and the other on the floor. The short pieces are placed across these to hold the conduit in place. The sketch will explain this more clearly. By moving the short pieces *A* and *B* higher up, a more secure position of the planks is obtained. The upper edge of *B*, over which the bend is made, can be rounded to the desired extent, or a small bend made and the conduit pulled out a little at a time for continuing the bend. J. H. Lamoureux.



Conduit Bending Without Bench.

Blanking Knockout Holes in Outlet Boxes.

In the issue of January 29 I notice a wiring kink advocating the use of tin caps in "blanking" holes in outlet boxes. A better way is to cut a piece of threaded pipe about five-eighths-inch in length and secure a three-eighths-inch knockout to one end by means of a monitor bushing. Insert this in the hole from the inside of the box and screw a locknut up tight on the outside. This makes a workmanlike job, and cannot be refused by any inspector, whereas tin, not being of the same strength and thickness as walls of the box, is liable to be condemned. John Shortt.

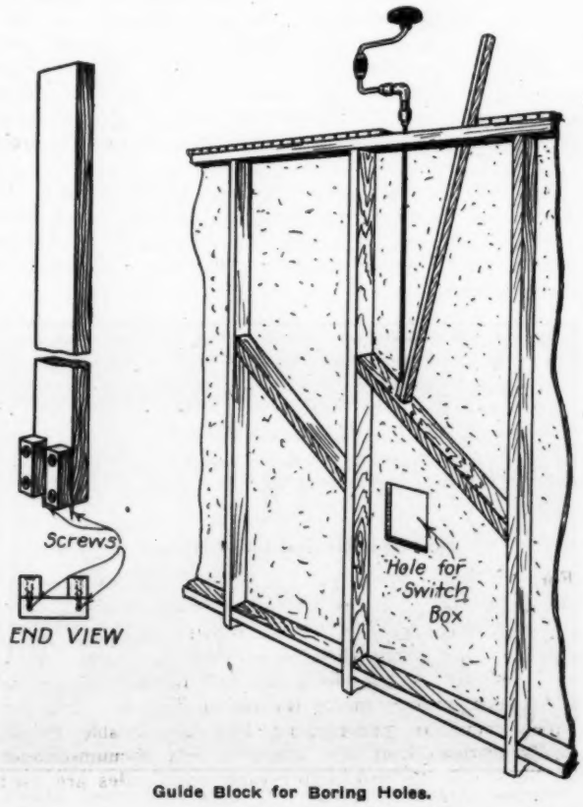
Guide for Boring Holes on a Slant.

In wiring old houses a great many times the wireman finds partitions with braces in them that set on such an angle that it is almost impossible to get a hole drilled in them at the right place. The following is useful for this.

I have a piece of wood about 7.5 feet long, 2 inches wide, by 0.75 inch thick, on one end of which are two small blocks, each 0.75 inch thick, 0.625 inch wide, by 3 inches long; these are put on with 1.25-inch No. 8 wood screws, although nails will do. Take two 3-inch No. 6 or 8 wood screws and screw them into the end of the board about one inch, then file their heads down to a sharp point.

Set it down in the partition as in the diagram at any place you wish to drill the hole and then with a long bit you will be able to drill many holes close together.

Take a No. 11 bit and have a blacksmith weld a steel rod 0.375 inch in diameter by 6 feet long on the one end and then square the other end to fit the brace; this bit I have found to be most useful. J. H. Glenn.



Guide Block for Boring Holes.

THE DEALER AND STOREKEEPER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-Keeping for the Dealer in Electrical Goods

Standard Window Display Being Distributed for "Wire Your Home" Month.

Nothing will more effectively call the attention of the public to "Wire Your Home" month than the thousands of uniform displays in the windows of central stations, contractors and dealers throughout the country. Co-operating with the Society for Electrical Development, electrical manufacturers and jobbers have distributed nearly 10,000 displays without cost to the recipients.

The display is easy to install and is not only descriptive of the advantages of electric lighting in the home, but shows the many other uses to which electrical energy can be applied.

In order to facilitate the use of this most attractive display we publish a photograph of the standardized display now being sent out by the Society. The material consists of six 15-inch circles, lithographed in eight colors; one banner, 11 by 47, lettered "'Wire Your Home' Month;" one card, with hand and switch lithographed in six colors, and 12 strips of paper tape and stickers for fastening.

The six circles are to be fastened to the window glass and from these white strips of tape run to the switch which is placed against the window background. Each circle represents a room in a home wired for electric service, and shows devices that may be used in that room.

In the photograph some of the appliances shown on the circles are displayed, a washing machine being used as a centerpiece. On one side of this is a dishwasher and on the other an electric range. Fans are elevated on pedestals; small devices being placed on boxes draped with velour. At either side near the glass is an electric radiator, and in the foreground a card reads, "Wire Your Home and enjoy not only electric lighting but also electric cooking, ventilating, cleaning, washing, sewing, ironing, heating, dish washing, etc."

If you do not receive a set of this material, write to the Society for Electrical Development or your lamp company, and one will be furnished without cost. It will be a most effective means of taking advantage of "Wire Your Home" month.

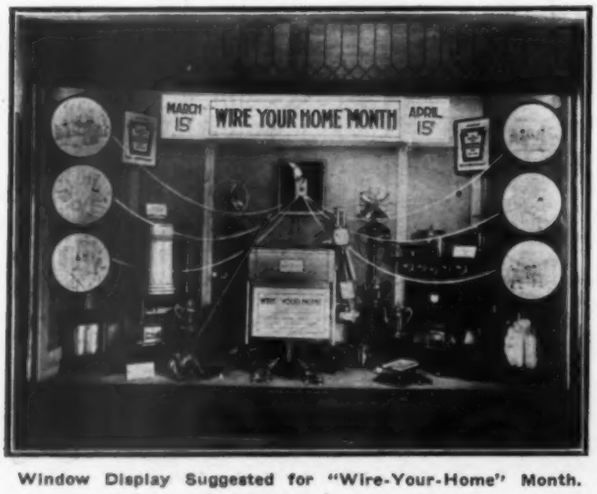
Vacuum-Cleaner Campaign Inaugurated in Kansas City.

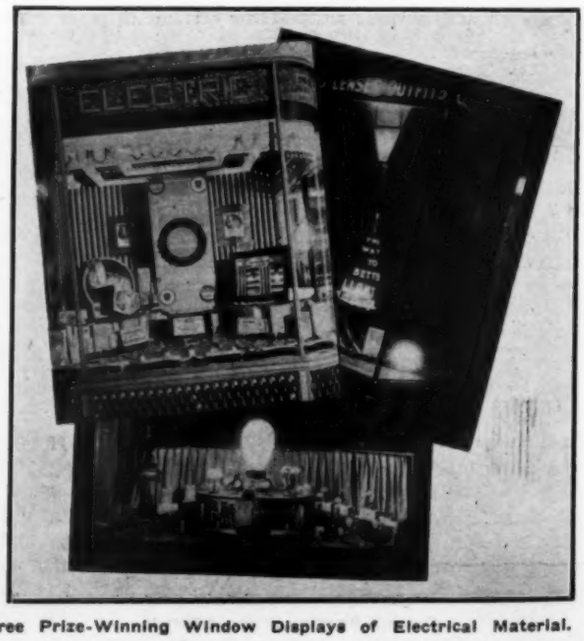
The Electric Shop of the Kansas City Light & Power Company has started a vacuum-cleaner campaign for March, which will be pushed vigorously by newspaper and other advertising, distribution of thousands of folders in homes, and on bills to customers. The company, which has been selling a comparatively new model of the Thor cleaner for $19.75, has made a special price of $15 for March, payable in six installments. Five hundred cleaners, it is expected, will be sold. The campaign will parallel the customary spring clean-up campaign of the City Health Department.

Winners of Prizes in National Window Display Contest.

The accompanying illustration shows photographs taken of window-displays winning second, third and fourth prizes in the window-display contest conducted and recently closed by the National Lamp Works of the General Electric Company. An illustration of the window that won first prize was published in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN for February 12, 1916.

The window shown in the upper left-hand corner was prepared by E. R. Davenport of the Narragansett Electric Lighting Company, Providence, R. I., and won the second prize. The window shown at the bottom was displayed by the Enterprise Electric Construction Company, Cleveland, O., and prepared by P. A. Kohl, winner of the third prize. The window shown in the upper right-hand corner was prepared by G. H. Jeffries of the Northern Photo Supply Company, Minneapolis, Minn., winner of the third prize.





Window Display Suggested for "Wire-Your-Home" Month. Three Prize-Winning Window Displays of Electrical Material.

Business Hints for the Electrical Dealer

Correct Margin of Profit Destroyed by Price-Cutting—Necessity of Considering Overhead Expense in the Conduct of Business—Results to the Small Contractor Handling Large Contracts Without Adequate Finances

By G. D. Crain, Jr.

Prices and Price-Cutting.

Occasionally one hears a complaint that the electrical dealer does not have the margin of profit to work under that he is entitled to, considering his overhead expenses and the special work that is usually needed to sell the goods.

There is something in this argument, in the case of a good many items, but on the other hand, did you ever stop to consider how many dealers would abuse a longer discount than they have at present?

One of the things which manufacturers are endeavoring to do is to protect the retail selling price. An article which is constantly the medium of cut prices gradually loses prestige, because the public comes to the conclusion that the quality is likely to vary as much as the price. It is bad business to have retailers making all sorts of prices on the same item, for the additional reason that the price tends to reach the lowest level, making the sale of the goods unprofitable for everybody and taking away the legitimate incentive which every dealer should have.

The courts have made it difficult to enforce resale price agreements, and the Stevens Bill, now before Congress, seeks to legalize such agreements. In the meantime, however, the manufacturer who sells his goods to the jobber or retailer loses control over the price at which they shall be marketed, except in the case of patented articles, and there are a lot of strings tied to that. The fact that the lamp business is handled on a reconsignment basis is one proof of the earnest endeavor of the manufacturers to insure the sale of their goods at the correct retail price—not merely one which will give them a profit, but one which will insure a legitimate profit for the merchant as well.

It is a peculiar fact, however, that a long enough margin to take care of overhead and still yield a good net profit would encourage price-cutting more than any other one thing. Some dealers, realizing the facts of the business in regard to costs, would gladly sell at the full price; others, anxious to get the business and not shrewd enough to analyze the situation, would conclude that they could cut the price and still make money, and the result would soon be a drop below the advertised price to a level fixed as the result of competitive conditions in each locality.

Therefore, the solution of the problem of getting a long enough discount rests as much with the retailer as it does with the manufacturer. When the dealers can show that they are real business men, and know how to sell goods without sacrificing their profits they will be in a position to go to the manufacturers and demand a long enough margin to absorb running expenses and leave a satisfactory net gain. But it is doubtful if such a showing could be made at present.

Everybody Knows It, But—

Not long ago the writer was talking with a veteran electrical goods merchant, who jobs as well as retails and who is familiar with every angle of the selling game as it pertains to the distribution of electrical goods.

"Keep hammering on overhead," he suggested, in discussing material for this department. "It doesn't make any difference whether you've written about it before or not—most of the dealers are still in the dark on this subject."

The point emphasized is a good one—not merely that an explanation of overhead expense is never out of order, but that stating a logical proposition does not always secure the universal adoption of the conclusion. In other words, no matter how often the trade papers point out the necessity of taking overhead expense into account in figuring the right price for an article of merchandise or an electrical job, there will always be a good many who either refuse to follow the advice or who cannot understand why they should not be able to get along without any such factor to contend with.

As far as overhead is concerned, however, nobody is doing such a small business that he can escape it entirely. Overhead is really the factor which must absorb all of the expenses of the business not directly chargeable to the individual item of goods or the particular job of labor. And even the man who has just graduated from the ranks of the journeyman will have some expense of this sort, if it is no more than telephone rentals, car fare and the purchase of tools. And the little dealer on the side street with a small store and a minimum rent must still acknowledge his costs if he expects to come out on top in the big struggle for business success.

The man who forgets overhead is like a polar explorer who throws away his compass. He has lost the indicator which will tell him whether he is traveling in the right direction or not. And, carrying the comparison a bit further, he may think he is making fine progress, and putting forth prodigious efforts, only to find in the end that he has been going around in a circle and arrived nowhere, if indeed he has not retrograded.

A Colossal Error.

Ambition is a good thing to have. In fact, it is absolutely necessary to the business man who is going to succeed. Without ambition you might as well quit running your own concern, with all its worries and risks, and take a safe and easy job with somebody else. It is legitimate, healthy, dynamic ambition that drives men ahead and results in carving out big niches in the hall of industry for their enterprises.

But there is such a thing as being too ambitious, as plenty of men besides Julius Caesar have discovered. An excess of ambition becomes a form of personal vanity, and the empty satisfaction of having handled a "big job" is often the only recompense for the man whose ambition led him to bite off more than he could comfortably chew.

In fact, on the dockets of the bankruptcy court in a certain city is the case of an electrical contracting concern which struck financial shoals just because the head of it was too ambitious for his own good. He wanted to do big things before he had demonstrated that he could cope with them by doing little things.

The fact that a great many small contractors forget is that they have their own field, which is practically safe from competition. There is any amount of small jobbing work to be had, to be handled at a good profit and to be used as a means of keeping the usually small capital of the concern working at maximum efficiency all the time.

Many a young business man does not realize it, but it takes capital to handle accounts. When you put a charge against Mrs. Smith for new batteries for her door bell and the installation of a buzzer in her dining room you are investing a part of your capital in that account. Until she pays the bill—which may be 30 or 60 days—you are not only waiting for your profit, but you are deprived of the use of the capital represented by your investment in the material and the labor and the overhead expense put into that particular job.

Now, having that clearly in mind, it is evident that the contractor with a limited capital should get as many small accounts as he can. The result will be handling jobs which can be completed promptly, so that the bills will fall due without delay. This will mean the collection of accounts receivable very rapidly, comparatively speaking, and the capital which is used to carry book accounts can be kept down to the smallest possible percentage of the total, leaving the remainder for the purchase of supplies and labor and the payment of overhead expenses of one kind or another.

This is a point which is not always grasped. The man who fails often insists that it was because of "poor collections," and the contractor who is not managing this end of his business right will tell you that he is hard up because his customers won't pay their bills as soon as they should. Statements of this kind indicate the fundamental proposition that in every business a certain amount of the capital is bound to be absorbed in carrying accounts has not been grasped. If provision has not been made to take care of this feature the man who is running the business is going to find himself always without the funds needed for the conduct of his affairs.

The big concern, with a large organization to be kept busy, is usually not in a position to go after small jobs. "Chicken-feed" of this kind would not be profitable. In other words, it is forced to seek the important jobs and leave the field of the small work to the contractor whose business is modest enough to enable it to be handled to good advantage. The larger house, with more capital invested, is in a position to take hold of a big job, which will take months to complete, and to wait for its money not only that length of time, but until the work is accepted and the routine ordinarily inseparable from the liquidation of a building account has been gone through.

Now, then, with these fundamental features in mind, consider the egregious folly of the contractor with only a few thousand dollars in his business going out after work which would involve the investment of that much in a single account. Such a course would practically mean business suicide, and that is exactly what happened in the case referred to above. The ambitious young contractor wanted to make a name for himself. He bid on a big piece of work—necessarily at bottom figures, as there was, of course, plenty of competition for the job—and unfortunately received the contract. The result was that during the next four or five months he saw every cent he could get hold of going into the "bottomless pit" of this work; and then for months more he waited until he could get his money.

He had other smaller jobs to finance, a payroll to meet, material bills to take care of, rent to pay and various other expenses to dispose of. The result of it all was that he got so deep in the hole that bankruptcy was the only way out. Maybe next time he will profit by his experience, but not necessarily. In a lot of cases a man who has failed under such conditions insists that it was due to bad luck or something else, instead of to ignorance of the basic principles of business management. Level-headed management of any business enterprise demands a knowledge of the capabilities and limitations of the business.

JOBBERS ARE CARRYING BIG STOCKS.

An Interview with Arthur J. Selzer, Sales Manager of the Central Electric Company, Chicago, Ill.

The statement, which has received considerable circulation, that stocks of electrical supplies were being depleted owing to a great demand for immediate shipment, has led to an inquiry to one of the leading Chicago jobbers as to the conditions of stocks. Arthur J. Selzer, recently elected chairman of the Central Division of the Electrical Supply Jobbers' Association, and sales manager of the Central Electric Company, Chicago, in answer to this inquiry said:

"Years ago the electrical manufacturer realized the importance of the electrical jobber as an economical method for distributing his products. Later the good electrical purchaser became thoroughly cognizant of this condition, but today the whole electrical world in unison has acknowledged this fact.

"For the past six or eight months the prominent electrical supply jobber has been stocking his warehouse from basement to roof with electrical merchandise to take care of exactly the problem which the buyer is now facing. The manufacturer's inability to get raw material and the over-crowded freight conditions for hauling his finished wares makes factory shipment of from ten to twelve weeks the work of a wizard.

"Compare this condition with that of the electrical supply jobber who can ship immediately from his own warehouse electrical supplies in any quantity from parcel post shipments to carloads!

"Although construction material is now commanding prosperity prices, the ease and low rate at which money can be secured has brought about an equalization that will create great activity in construction work this coming spring. The electrical supply jobber has prepared for this condition and merchandise will be dispatched with the same speed as in normal times.

"When this year has passed into history, the jobbers' worth will be so thoroughly established in the electrical buyers' good graces that 'economical distribution' and the 'electrical supply jobber' will be synonymous."

Demand for Electrical Supplies Indicates Prosperity to Philadelphia Men.

Touching on the prosperous condition of the electrical supply business in general, with particular reference to the motor market, representatives of well known Philadelphia electrical concerns, have given out statements during the past week, as follows:

F. E. Dolbier, engineer for Walker & Keppler, electrical supplies, declared that the demand for electrical appliances had actually run riot in the past year.

"Manufacturing plants working on war materials are swamping the electrical industry with orders for motors, so that they can crowd on every ounce of power possible to turn out their work speedily. With big profits ahead, the expense incident to changing from one form to another is not given a second thought. Production is the thing, and the initial expense of a new installation is considered as nothing in view of the ultimate result attained. Even second-hand motors are commanding a premium." The demand affects not only motors but every class of supplies, he declared.

Frank H. Stewart, of the Frank H. Stewart Electrical Company, was among others to concur in the opinion that never before had the electrical supply business even approached its present prosperity. Mr. Stewart, who speaks from an experience of 24 years, declared that supply men could not possibly get out from under the great avalanche of orders, even if they wanted to.

CORRESPONDENCE AND DISCUSSION

A Reader's Page Wherein Opinions on Topics of General Interest May Be Expressed

Grounding of Secondaries.

To the Editor:

The recent articles appearing in this paper appertaining to the grounding of secondary systems are, I think, of deep import to the inspection departments at large. We have seen distinctly contrasted the liability of fatalities due to contact with high potential in ungrounded systems and the increased fire risk incurred in grounded systems.

Apparently, which course should be pursued opens a wide field which experimentation and practical experience will no doubt ultimately solve.

In this connection it might be advisable to note that experience in this section has shown that the majority of cases of fatality on ungrounded secondary systems have been attended by unusual circumstances in relation to the condition of the equipment.

In one case tests made after the accident showed no breakdown or defect in insulation of any part of the system. This leads me to believe that, as shown by Mr. Croft in his article, primary circuits, although clear of ground, may be dangerous to touch by a person in contact with ground, due to inductive and capacity effects extending perhaps over a considerable area. This condition, I personally believe, is possible between primary and secondary circuits where both primary and secondary systems extend in close proximity over a considerable area.

The point I wish to emphasize is that it is not always necessary for metallic contact between primary and secondary, such as a transformer breakdown, to have a dangerous potential between one or both of the secondary wires and ground.

We are assured of one thing, at least, that when the secondary system is grounded, there is absolutely no chance of direct-connected, induced or high-potential static to exist to ground.

In view of the foregoing facts I am in favor of the grounded secondary system, and in this connection I agree with Mr. Hill in his contention that to all intents and purposes the fuse on the grounded side of a system is useless, and that it would be of considerably more value if it were placed in series with the other fuse on the live side.

This would make necessary the bridging of both fuses to kill the required protection of the system.

A. V. G. Doremus.

Inspector, Bureau Electrical Inspection, City of New York.

New York, N. Y.

To the Editor:

Mr. Hill's comments, printed in your issue of January 15, relative to the writers article "Transformer Wiring Practice" which appeared in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN for January 1, indicate that he has devoted considerable thought to the subject of secondary grounding. Mr. Hill writes: *I should like to have an expression from him (Mr. Croft) as to whether he does not believe that the fire and life risk are abnormally increased due to the grounding of secondaries on 100 per cent of transformers for the purpose of anticipating accidents to less than one-half of one per cent of actual failures or collapses.*

Frankly, the writer hesitates to express an opinion relative to this particular situation inasmuch as he has not made a study of it. Obviously, such an opinion should be based on the data and the statistics of the case with which the writer is not, unfortunately, familiar. However, it must be confessed that the facts to which Mr. Hill draws attention are important and certainly worthy of very mature consideration.

The thought occurs to the writer that when the "so-called" concentric wiring systems are used, the branch circuits of which, as Mr. Hill suggests, will be protected by only one fuse, the repair man will hesitate to "copper" this fuse. Insofar as we are aware no difficulties have been encountered from this source in the European countries where concentric wiring systems are extensively applied.

Furthermore, as Mr. Hill suggests, it should be determined as to who should be responsible for making periodical inspections of secondary groundings.

St. Louis, Mo. Terrell Croft.

Facilitating Customer's Development.

To the Editor:

With reference to the practice of a Western central station in furnishing transformers to consumers, as published in your issue of January 15, of course, the point made is a very good one where the consumer furnishes the transformers and where the central station is not very much concerned in line and transformer losses, which would be the case on a hydroelectric system where it is not necessary to store water for use during a dry season. I question, however, the advisability of encouraging such a practice in general, and believe it would be more satisfactory for the transformers to be somewhere nearer the size desired. As the load increases additional transformers can be installed and banked with the ones originally put in.

Where the transformers are furnished by the power company it is not a difficult matter to make changes so as to keep the transformers installed somewhere near the capacity required to furnish the load. I believe there are other ways in which the power company can help to build up an industry than by encouraging a practice that is an economic loss. We are rapidly reaching the stage where we must seek for efficiency in every branch of our business, although, of course, we must not let our endeavors to increase efficiency interfere with good business practice.

We have made it a particular point, and are giving it more attention now than heretofore, to have transformers, not only for our consumers, but in our substations, as nearly loaded to capacity as possible, in order to improve conditions on our system and cut down unnecessary losses. With the exception of our reclamation business and certain of our mining business, it is our practice to furnish transformers for consumers, and as the matter is entirely under our control it is not hard to keep the capacity down to the requirements, although, of course, where we know the load is to be increased within a reasonable time we will put in more capacity than is required to start with.

S. V. Walton.

Manager, Commercial Department, Pacific Gas & Electric Company.

San Francisco, Cal.

QUESTIONS AND ANSWERS

All readers are invited to submit questions and answers to this department. Anonymous communications will not be considered. Questions should relate to electrical matters of any kind. Answers contributed by readers should be received preferably within ten days of the date of publication of the question. Payment will be made for all answers published.

Questions.

No. 333.—Electric Car Heating.—Has any system of electric heating been developed for electric street cars, elevated or subway trains, which gives a more uniformly distributed heat than the electric coils now commonly used under the seats? I have heard many complaints on very cold days that the seats are uncomfortably hot while the floor is chilly.—A. P. G., Chicago, Ill.

No. 337.—Master Switch for House Lighting.—There are thirty lamps in a house arranged on three circuits. It is desired to be able to light all of the lamps throughout the house by means of a master switch placed along the bed of the owner in one of the bedrooms. I have heard that it is possible to do this. What special wiring is necessary?—O. P., Lewiston, Idaho.

No. 338.—Grounding of Motors.—What is the best way to ground a group of motors? Can motors of different voltages be connected to the same ground plates, say in the case of 110, 220 or 440-volt alternating-current machines?—R. B., Jackson, Mich.

Answers.

No. 322.—Jobbers' Trade Names.—Is the common custom of jobbers of putting their own firm name or some special trade name on articles (thus disguising the real manufacturer) regarded as good commercial practice? Does it promote sales? Does it not injure the interests of the manufacturer to have his products sell under several trade names?—W. T. K., St. Louis, Mo.

The question at issue will have to be answered conditionally, because it is obvious that the gain or loss depends upon the article in question, the condition and manner of sale, the facilities of the jobber and the "commercial state" of the manufacturer.

The practice, adopted by jobbers in many lines, of offering goods under distinctive trade names or brands of their own involves a number of important points. Many of these have been discussed at considerable length at meetings of hardware jobbers and manufacturers, so that the inquirer should find light on this subject in the trade journals covering the hardware field. Among the points involved are these:

(1) The use of jobbers' brands instead of the manufacturers' trade names transfers the expense of the advertising from the manufacturer to the jobber. The latter can no longer profit by any national advertising on the part of the manufacturer, but must pay for advertising his own brand. However, this is easily offset by the advertising resulting from the use of the same brand or trade-mark on other classes of goods distributed by the same jobber. In other words, instead of re-inforcing and profiting by the general advertising of a dozen manufacturers offering various products under as many different trade names, the jobber can offer all under a single trade name controlled by himself, thus making the sales of each article act as publicity for all the others.

(2) Since the jobbers' distinctive labels are usually affixed to the goods themselves, the practice of supplying the same article to a number of jobbers under different trade names complicates the manufacturer's stock and shipping methods. Where the goods are shipped from the factory in large quantities, this is not objectionable, but becomes so where the various jobbers order in comparatively small quantities and expect the articles comprising each shipment to be distinctively labeled. In the latter case, the special labeling interferes with prompt shipments from the factory unless the latter carries a stock of duplicate lots bearing the different labels. It may also interfere with economical packing and shipping, as in the canned-vegetable lines where the necessity of access to the boxes for affixing "jobbers'" labels to the cans has barred the economizing on freight rates by the use of wire-bound boxes.

(3) Jobbers' brands tend to restrict competition and price-cutting. Where a manufacturer's brand is specified, any dealer can bid on the same; but where the specifications call for a distinctive jobber's brand, it may require considerable effort for a competitor to secure the order, even though the goods offered are identical except as to the labeling. So, also, where identical articles are offered by stores and mail-order houses, the former need not be influenced by the cut prices of the latter if the markings are sufficiently different to warrant some sales talk as to superiority. Hence the practical boycotting by dealers in some lines of those manufacturers who allow their products to be sold by mail-order concerns under the same names under which they are offered to the trade.

(4) Unless the manufacturer adequately controls the product by patents or superior manufacturing methods, his supplying the goods to be sold under a jobber's brand will leave the jobber free to contract for the same elsewhere. This point has often been overlooked by manufacturers, who jumped at the chance of securing large orders from jobbers of established reputation (thereby profiting by the advertising value of the latter) and who afterwards found themselves only to be competitive bidders for the privilege of manufacturing duplicate lots of the same goods.

(5) Even where the article is patented (thus giving the manufacturer the control during the life of the patent, unless the jobber finds a way of evading the patent and offering the substitute under the same trade name) the jobber offering this article under his own brand may have a decided advantage at the expiration of the patent. For example, where a distinctive trade name controlled by the manufacturer is continuously associated with an article made under a certain patent, also controlled by the same party, this trade name becomes public property upon the expiration of the patent. However, if the jobber is one of a number who have distributed the patented article and if the trade-mark used by the jobber was adopted and registered by him, this trade-mark continues in force and may be renewed indefinitely as long as it continues to be used.

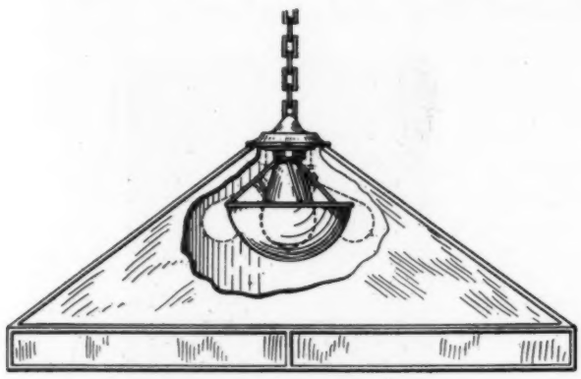
Of course, both the manufacturer and the jobber can usually modify the effect of the above-named influences by a careful wording of the contracts between them. However, such a wording must take due cognizance of the statutes and decisions covering patents, trade-marks and unfair competition, hence the importance of having documents of this class prepared by specialists.—Albert Scheible, Chicago, Ill.

No. 327.—Reducing Glare from Table Lamps.—I have observed that practically all table lamps cause eye strain to children reading or playing on the table by shining glaringly directly into their eyes, if the children are not sufficiently tall to have their eyes screened by the shade or dome. Can anything be done to reduce this glare, aside from using full-frosted lamps?—P. M. C., Lockport, N. Y.

A simple expedient that I have found useful in relieving the glare from reading or other portable table lamps is to stretch a very thin sheet of silk or other almost sheer fabric across the bottom of the shade. If the latter is circular and has smooth bottom edge, a fairly neat and tight joint may be made after some trial. The best way is to have a circular brass wire rim to the sheet and secure it just inside the shade by inconspicuous clasps. The sheet can have one radial slit and a central hole to pass around the stem; after it is in place the slit is closed by means of clasps similar to glove fasteners; then it is secured to the inside of the shade. I first tried this scheme out with tissue paper which I glued to the inside of the shade. The sheet chosen must be thin enough so as not to cut down the light too much, but dense enough to act as a diffuser and effec-

tively diminish the glare. I believe that portable lamp manufacturers could easily get up a design of table lamp in which a circular light-opal glass plate was provided just above the lower inner edge of the art shade. It might be made in two half-circular parts with a central hole and supported by a light annular brass rim which is held by light arms from the stem and also supports the shade.—F. H., River Forest, Ill.

Even a full-frosted lamp if used under domes as commonly placed over dining-room tables is so directly in the line of



No. 327.—Reducing Glare from Dome-Type Table Lamps.

vision as to cause eye strain for all seated around the table. A better and inexpensive solution of the problem is shown in the accompanying diagram of a dining-room light which originally had a cluster of lamps. A single lamp of higher candlepower was substituted for the cluster and a glass hemispherical shade (taken from a portable lamp, and of the kind having spring clips which grasp the lamp bulb) was snapped upon this single lamp. The result is exceedingly restful, while the shade can easily be removed for cleaning or for affording a more intense light while the table is being set.—Albert Scheible, Chicago, Ill.

No. 332.—Electric Belts.—Does any recognized authority on electrotherapeutics find any curative value from the use of the so-called electric belts? Has their sale or exploitation ever been prohibited?—J. S. C., Dayton, O.

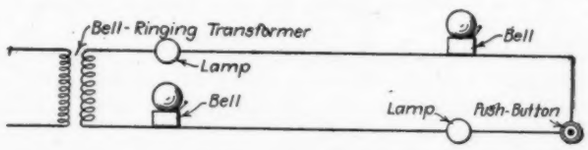
I am inclined to believe that no curative value is obtained from the use of such devices. I have been manufacturing electrotherapeutic apparatus for many years and am conversant with most every state of the art. The United States Government, not more than four years ago, proceeded against a manufacturer of electric belts in New York whose product had been on the market for more than twenty years. Also against a Chicago manufacturer of electric soles whose product was extensively advertised. The contention of the Government in both cases was that the devices in question as advertised by the makers do not do what the makers claim for them, and consequently their sale was prohibited through the mails.—G. W. E., Pittsfield, Mass.

Electrotherapeutics in general embrace the use of electricity in the alleviation and cure of diseases; that is, a *real* use or *legitimate* use. In no authority on electrotherapeutics (or magnetotherapy) to the writer's hand is there any sanction of the so-called "electric belt," "magnetic girdle," *et al.* But, just the opposite, such devices and contrivances are consigned to the medical quack and charlatan. In the medieval period many magical properties were attributed to lodestone, amber, etc., and since superstition and mystery-worship still thrives today in a greater degree than our modern enlightenment would seem to allow, many ignorant people are taken in even now by methods worthy of the most expert magical savants of the dark ages. Some of these methods *superficially* appear to have scientific principles back of them, due to misconceptions. For example, a wave of change of electrical state similar to the currents of action (as the term is used in medical application) traverses a nerve which has been stimulated; this wave travels at the same rate as the nervous impulse (about 31 yards a second in a frog's nerve)—a rate so much slower than that of an ordinary electric current, that by itself it suffices to show that the nervous impulse is something essentially different from an electric current. The association of such electrical changes with vital phenomena, when first observed, led some too hasty people to the conclusion that they were identical, a view to which are due the foolish statements, such as "Electricity is Life," which figures so prominently in the advertisements of various quacks. (Understand, however, that this last statement does not seek to undermine the electron theory or modern views on the *constitution* of matter, mind, etc., which seem to indicate that life really *is* electricity. That is a different matter.)

As regards the sale or exploitation of electric belts and similar lures, attention is called to the work of the American Medical Association in its propaganda for reform which is continually being carried on. In this work anything (patent medicine, appliance, course of treatment, etc.) seeming to bear the hall-marks of fraud is carefully investigated in the Association's laboratories and, in some cases, the Bureau of Standards or other government laboratories, experts, etc., being brought into use. If the charge of fraud be established, then the Federal Government steps in and prosecutes according to the "fraudulent-use-of-the-mails act." In case the mails have not been used in connection with the fraud, it is to be supposed that state law may be resorted to in the ordinary way. Hardly a month goes by that some fake is not unearthed through the medium of this reform propaganda. One of the first of the so-called electrical magic cures to be dealt with was that of the "Electropoise," so much in vogue (?) 20 or 30 years ago. Quite recently the Oxybon Company, of Chicago, got into the toils. An outline of this case appears in the *Journal of the American Medical Association* of February 12, 1916. The article makes interesting reading and gives an insight into the tricks of the trade, which may be recognized in connection with a number of other wonderful (?) cures now being exploited.—P. B. W., Verbena, Ala.

No. 336.—Visual and Audible Signal.—I should like to know whether it is possible (and if so, how) to wire a simple but positive signal system which will indicate at the same instant at the sending and receiving points by means of lighting red lamps and ringing large gongs for perhaps half a minute. That is, the man at the sending end must know positively by the lighting of his lamp and ringing of his gong that the combined signal was properly actuated at the receiving end without a special answer-back signal.—G. S. C., Joplin, Mo.

The diagram gives a very simple and troubleproof method of wiring the visual and audible signal. The diagram is easily read and needs no explanation. The bells and lamps must be selected to operate on the same amperage, and the



No. 336.—Series Arrangement for Visual and Audible Signals.

sum of their voltage ratings should when added to the line I^2R drop be nearly equal to the E. M. F. of the source of power. If direct current is used, one of the bells must be a single-stroke type and the other a vibrating bell. If large signal lamps are desirable and the bells cannot carry the current, a relay may be used in the series circuit and the lamps put in a local circuit. It is to be noted that the source of supply must be at the receiving station or otherwise that station would not receive the signal, but the sending station would, if the line were crossed.—H. E. W., Chicago, Ill.

NEW APPLIANCES

A Weekly Review of the Latest Developments and Current Information Respecting Electrical and Kindred Mechanical Appliances

New Control Equipment for Charging of Starting, Lighting and Ignition Batteries.

The line of charging apparatus for use with batteries on starting, lighting and ignition systems has recently been augmented by the addition of a new small type of rheostat, such as is shown in Fig. 1, and by a larger one, made particularly for charging a number of gasoline-automobile batteries in series.

The former is intended for mounting on a wall or switchboard and consists of several resistance units inclosed in a sheet-iron case. On the slate panel there are several contact buttons with a convenient operating lever and two binding posts at the top for connecting to the batteries. For this small type, designated by the manufacturer (the Cutler-Hammer Manufacturing Company, Milwaukee, Wis.) as "G," two sizes are made for connection to 115-volt direct-current circuits. The boxed weights are given

Fig. 1.—Rheostat for Charging of Lighting and Ignition Batteries.

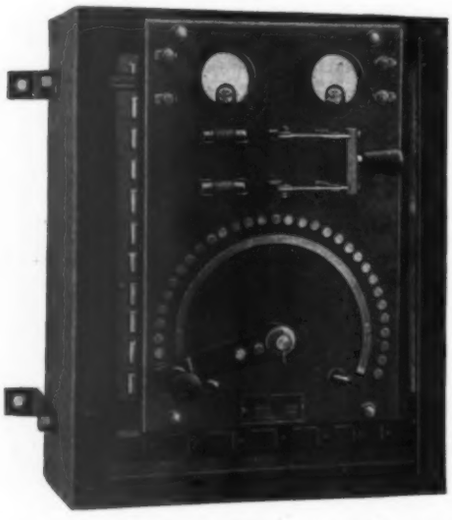


Fig. 2.—Charging Board for Large Gas-Car Garages.

as 16 and 24 pounds, respectively, and the maximum and minimum charging rates are 5 and 2.5, and 10 and 5 amperes, based on charging the usual three cells of a six-volt system in series.

The type shown in Fig. 2 is particularly well suited for the larger garage where it is desirable and economical to charge a number of motor-car batteries in series. They may be used to charge any number of cells up to 44 lead or 60 Edison cells on a 115-volt circuit, or up to 88 lead or 120 Edison cells on a 230-volt circuit.

The apparatus consists of a sheet-metal frame arranged for wall mounting, containing the resistance and carrying a slate panel on which is mounted a movable arm with suitable contacts. Thirty steps of adjustment are provided. When required, a double-pole main-line knife switch, an ammeter, and a voltmeter can be furnished mounted on a panel as shown in the illustration. The ammeter is permanently connected in series with the rheostat, and indicates the charging current at all times. The voltmeter has a 15-volt scale and is intended to be used with flexible leads so that the voltage of the separate batteries can be easily obtained.

The Master Cronograf.

In the issue of May 8, 1915, a description was given of a time-study watch, which was being marketed by Mortimer J. Silberberg, 755 Peoples Gas Building, Chicago, Ill. A more recent model of this time-piece, known as the "master cronograf," is illustrated herewith.

The ordinary hour-hand and minute-hand of the watch are retained in this model, and the dial is marked off in seconds and fifths, as with other stop watches. To eliminate time-robbing calculations, a series of numbers are placed around the outer circumference of the dial for giving the output per hour. For any period of elapsed time the corresponding output per hour is indicated. Thus if 29

Master Cronograf.

seconds are required to perform an operation, as shown by the stopping of the large hand, the reading 124 directly under it is the corresponding output per hour. If the hand stopped at 19 seconds the output would be 190 per hour.

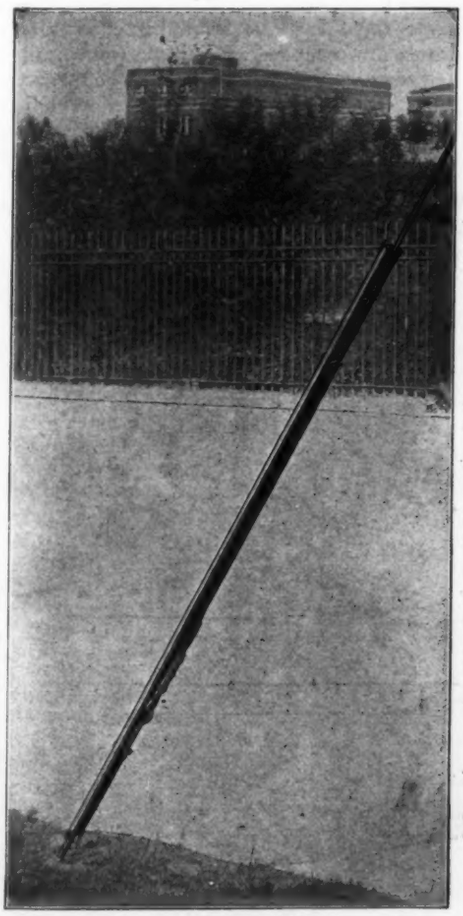
In cases where the duration of an operation is more than one minute, the figures on the extreme inside of the dial are used. Thus if the large hand made one entire revolution and went 10 seconds beyond, 51 operations per hour can be performed. In the case of very short operations it is well to time ten operations, and multiply the reading by 10.

This instrument is a high-grade, 17-jewel watch in gunmetal case, and is accurately adjusted and guaranteed. It is invaluable for making motion studies and eliminating lost time and motion.

Bierce Guy-Wire Protector.

Wires used for guying overhead pole lines and similar structures need to be protected so that pedestrians, automobiles and vehicles do not run into them. It has been the common practice to use old pipe, wooden boxes or posts driven into the ground for this purpose. The objection to pipe is that it leads rain water to the anchor rod and this quickly rusts and weakens or destroys it. Wooden boxes are easily broken and soon decay.

To overcome these disadvantages a special but simple form of guy-wire protector has been placed on the market by the Specialty Device Company, 112 West Third Street, Cincinnati, O. This Bierce device is made of heavy sheet steel formed to a half circle. It is 7 feet long and weighs 12 pounds. A clamping device shown in the sectional view is placed 18 inches from each end. By means of these clamps the protectors are quickly applied on any part of the guy wire desired. One of the clamps has its U bolt one inch longer than the other to enable it to be clamped over the anchor rod, if desired, while the other clamp is secured to the guy wire in the ordinary way. The protectors are neat in appearance and readily visible from all directions. Their length is sufficient so that the top of the protector will be above the level of a man's head even when the bottom of the protector is near the ground level.



Bierce Guy-Wire Protector in Place.

Sectional View of Guy-Wire Protector.

Bakelite-Dilecto—A New Insulating Material.

Since the development of the insulating material known as Bakelite, various modifications in this compound made under the general Bakelite patents have been developed to meet special requirements. One of these is known as Bakelite-Dilecto. Although this material has been in course of gradual development and perfection for three or four years and is at the present time used by practically every large electrical manufacturing company in this country, the properties of the compound have not been generally known. Before touching on these it may be said that in every case where this material has been purchased ordinarily in small lots, the excellent results obtained with it have led to a steady increase in its consumption. Manufacturers have found that it is adaptable to a wide range of applications.

This material is made in two grades, of which the XX grade is said to be the best laminated insulating material known. This grade is furnished in sheets, rods and tubes, or it can also be furnished in finished shapes to suit specifications. It is of exceptionally high dielectric strength and is absolutely waterproof, unaffected by ozone, highly resistant to heat and acids, and is strong and tough.

On account of its ability to take a fine finish it is also used in many purely mechanical applications. It is made in any of its natural colors, which are brown, red and black; the latter is used in many cases where hard rubber has heretofore been employed, as it possesses all of the good properties of hard rubber and many that are vastly superior to those of hard rubber; among the latter are that it is not affected by ozone and does not deteriorate or change in color with age. This material is used very largely for high-voltage insulation and may be easily machined, turned, planed, milled and tapped.

This compound is a laminated material, that is, it is built up of successive layers of material saturated with Bakelite and compressed together with extremely high pressure. This method of manufacture is the secret of the very great strength possessed by this material.

Bakelite-Dilecto is also manufactured in a grade known as X, which is somewhat cheaper than the grade XX. In the main it is identical with the latter, but is not absolutely waterproof; however, it will not absorb moisture from the atmosphere to nearly as great an extent as fibrous insulating materials and therefore does not warp or change its shape. This grade X is made in sheets and tubes only. The fact that both grades of this material

may be made into tubes, either round, square or of any other section, makes it adapted for coil cases and similar work.

Bakelite-Dilecto is manufactured by the Continental Fibre Company, Newark, Del. This company is in position to render special service to manufacturers in the way of recommending certain grades of this compound to give satisfaction for particular purposes.

Olympian Ornamental Iron Cluster Post.

The undiminished popularity of street lighting with ornamental posts is calling for new designs to meet special requirements. The company that has been one of the leaders in the manufacture of posts for ornamental clusters is the Flour City Ornamental Iron Works, Minneapolis, Minn. The Corinthian cluster post manufactured by this company has for some years been looked upon as one of the most classic designs for this type of lighting and is installed in many parts of the country. The company has now added a new pattern known as the Olympian type. It is lighter in construction and is made for either three or five lamps. This new post has been

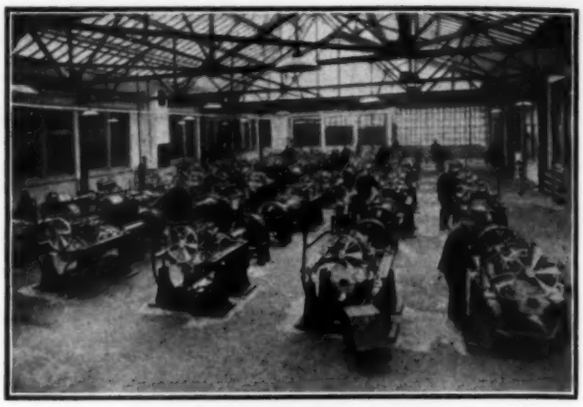
New Olympian Ornamental Cluster Post.

designed with extra care for economy in material and manufacture as well as elegance in appearance. It is made by experienced molders from the best grade of pig iron. In general construction it bears out the high grade set by the company's Corinthian standard.

Electrically Operated Test Room of the Packard Motor Car Company.

The Packard Motor Car Company, Detroit, Mich., strives continually to attain to that measure of quality of which it is justly proud. The Packard standard is upheld by skill in designing, selection of materials, and care in manufacturing. But to further insure a perfectly running car every engine is carefully tested before being installed in its car. In the illustration are shown 40 of these engines in the large Packard test room.

Forty Westinghouse 15-horsepower direct-current motors are shown driving these engines so as to grind in all the bearings and wearing parts. When the engines operate smoothly and with the minimum amount of friction demanded by the Packard standard, this is shown on the ammeter used in connection with each electric motor. As the engine runs easier the current decreases until the point is reached where the highly desired smoothness of



View in Packard Test Room.

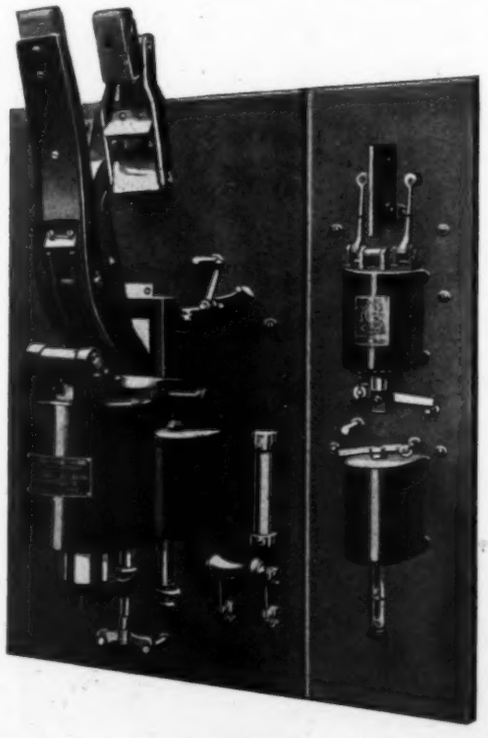
action of the Packard is obtained. Every Packard engine goes through this test room for its rigid test for reliability, smoothness of action, etc.

Feeder-Circuit Relay for Automatic Reclosing Circuit-Breaker.

The Automatic Reclosing Circuit Breaker Company, Columbus, O., has recently developed a new style of relay, known as type F-2, to operate in conjunction with its line of automatic reclosing circuit-breakers, which were described in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of May 15, 1915.

The standard form of automatic reclosing circuit-breaker is designed to control the entire current input to the circuit and will not operate satisfactorily in a feeder circuit where such feeder is supplying current to a load circuit that is also supplied by current from other points.

This new feeder-circuit relay is designed especially to operate with circuit-breakers connected in a circuit supplying current to a distribution network. The accompanying cut shows the feeder-circuit relay operating in conjunc-



Automatic Reclosing Circuit-Breaker with Feeder Relay.

tion with a 1,200-ampere type D automatic reclosing circuit-breaker. The special feature of this relay is that it has a potential adjustment whereby the breaker may be set to reclose at any voltage from 50 per cent normal to full voltage on the load side of breaker.

Should the breaker open due to an excessive load, it will reclose at the expiration of a short time interval, provided the voltage on the load side of the breaker is not excessively low; should the voltage be excessively low so that breaker would immediately open were it to reclose, the potential adjustment may be set so that the breaker will not reclose until the voltage has risen to a safe value, but the instant the voltage does reach the allowable value, the breaker will automatically reclose. Should a short-circuit occur, the breaker will of course remain open until the short-circuit has been removed.

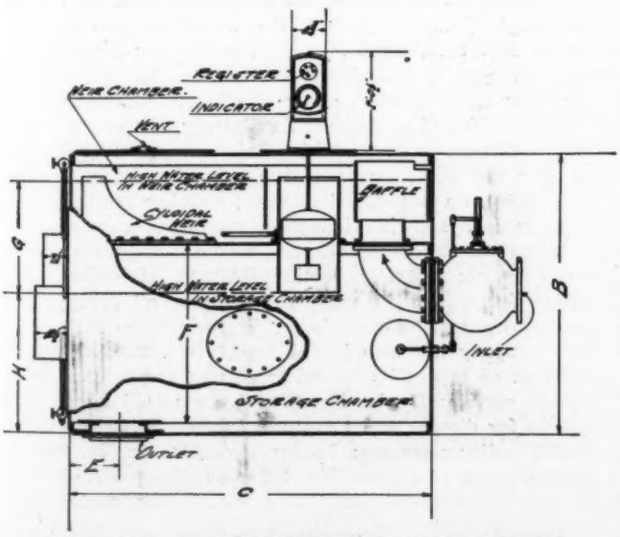
Another feature of this relay is that it enables the breaker to be used on a network where a number of feeders are supplying current to a common load or it may be used on an independent circuit, where breakers control the entire current input to the load. When used in either connection, the breaker will operate entirely automatically and will reclose only when line conditions are right and no short-circuit exists.

A dead-load adjustment is provided for the breaker whereby it will reclose on any predetermined amount of load, such as lamps, self-starting motors, etc., but will not reclose on an actual short-circuit of low resistance. This combination of feeder-circuit relay and circuit-breaker is especially suitable for the protection of rotary converters or generator sets in small substations supplying current to mines, street railways, mills, etc., where the switchboard attendant has other duties to perform besides looking after the circuit-breaker.

The potential adjustment on the relay furnishes a certain means of having the breaker close only when proper voltage relations exist between the generator protected and the load circuit. This eliminates the necessity of having a voltmeter or other means of indicating proper voltage for the operator to close the breaker, it also eliminates the human factor in operating the breaker, thus making the operation more certain to occur at the proper time.

Kennicott Cycloid-Weir Water Meter.

The use of the weir has long been recognized as possessing special advantages in measuring the flow of water or other similar liquid. An improved type of weir meter that is now attracting much attention is the Kennicott cycloid-weir meter.



Internal Arrangement of Kennicott Cycloid-Weir Meter.

The cycloid weir is the heart of the new Kennicott cycloid-weir meter. The scale drawing herewith shows this cycloid weir correctly located in the weir chamber, through a slot in the cycloidal face of the weir.

A study of this cycloid weir reveals the following: The lower the head falls, the greater the proportion of the opening through which the water flows from the weir chamber. As the water rises, the proportion of the opening decreases. This condition offsets the varying flow of water, which would ordinarily result from lowered or increased pressure. The exact proportion is thus automatically maintained, regardless of the head of the water.

By this construction the opportunity for error has been reduced and greater accuracy assured by this utilization of a new principle for the flow meter. This unit therefore provides a weir, through which the rate of flow is at all times proportional to the head of water above the crest of the weir.

The manufacturers of this weir-type meter point out two principal reasons why the cycloid weir is accurate:

First—At low flows, for example, when there is from 1 to 2-inch head over the crest of the weir, the water invariably flows clean from the surface of the weir. It does not trickle or drizzle down the face of the weir. Thus the cycloid weir has overcome one of the primary objections to this type of meter.

Second—Since the flow of water is in exact proportion to the head, the float which operates the registering mechanism accurately registers an average height above the crest of the weir. The mechanism is driven in proportion to this average height. As the flow is proportional, this condition automatically compensates for any slight variation in the water level above or below the average height. The weir is therefor compensating and not cumulative, as is the case where the flow of water is not in exact proportion to the head.

The Kennicott cycloid-weir meter, as designed, has, therefore, seemingly overcome the main objections offered to the ordinary flow meters where the head is not proportional to the rate of flow, since the former type of flow meter must embody mechanism necessary for the computation of a fairly accurate result.

Other advantages claimed for this meter are: It is the most accurate device of this type being offered, as has been demonstrated by a series of experiments. It is wonderfully simple and has nothing to get out of order. It is accurate at all rates of flow within the capacity of the meter. Changes in temperature do not affect its operation. There are no parts to warp and there is no friction. It will measure boiler-feed water from an open heater, condensation water, or any free flowing liquid, hot or cold.

This meter is manufactured by the Kennicott Company, Chicago Heights, Ill.

Leakage of Current from Electric Railways.

A study of the problems connected with the leakage of current from electric railways has recently been completed by the Bureau of Standards, Department of Commerce, and the results just published in Technologic Paper No. 63.

The theory of the leakage of current from electric railway tracks is developed mathematically, and curves are then plotted to aid in the interpretation of the results. The conclusions to be drawn from the formulas and curves are discussed with special reference to practical problems in electrolysis. It is shown how the escape of electricity from the rails is affected by increasing the track conductivity, as by careful bonding of all joints; by the use of a high resistance roadbed; and by shortening the distance over which a power house or substation furnishes power.

INDUSTRY ACTIVITIES

The Globe Stove & Range Company, Kokomo, Ind., announce the successful test and approval of Globe electric ranges by the Good Housekeeping Institute.

Westinghouse Church Kerr & Company, engineers and constructors, 37 Wall Street, New York City, have issued a folder giving an illustration of saving in concrete construction.

Cooper Hewitt Electric Company, Hoboken, N. J., has issued an eight-page booklet which gives a reprint of an illustrated article on "Portrait Lighting with Mercury-Vapor Lamps."

The Trumbull Electric Manufacturing Company, Plainville, Conn., has issued the February number of "Trumbull Cheer," which has preparedness as its keynote. Illustrations and prices are given of the Trumbull "standard" attachment plug and new design No. 701 combination switch.

Sprague Electric Works of the General Electric Company, 527 West Thirty-fourth Street, New York City, has issued bulletin No. 48705, on direct-current motors and controllers for flat-bed and small rotary printing presses. The company also has issued an 18-page booklet on electric fans.

The Union Metal Manufacturing Company, Canton, O., has issued an attractive booklet on its lines of entrance standards, wall brackets, exterior newels and garden fixtures. The Chicago district sales manager for the Union company is the Minerallac Electric Company, 1043 Washington Boulevard.

Crouse-Hinds Company, Syracuse, N. Y., has issued Bulletin No. 1C, a supplement to its panel and cabinet Bulletin No. 1, which gives listings of its line of narrow panels and revised listings of types O and P panels. The company has also issued catalog sheets on multimeter panelboards and adjustable trim fasteners.

Westinghouse Lamp Company, 261 Broadway, New York City, has issued a new handbook for the benefit of electrical salesmen. This handbook is the fifth of a series issued during the past six months, these books being designed to furnish valuable information to electrical salesmen in order to make them more efficient. The company supplies these books without charge upon request.

General Electric Company.—Business at the Pittsfield, Mass., plant during January and February of this year was the largest in the history of the plant. Nearly all the orders were for materials purchased by companies in the United States. Among the large orders was one for transformers for the Montana Power Company, to be used in the electrification of the Chicago, St. Paul & Puget Sound Railroad, duplicating an order for apparatus furnished two years ago.

The National Electric Utilities Company, manufacturer of Neuco heating appliances, has removed its offices and display rooms to the Grand Central Terminal Building; 103 Park Avenue, New York City. The factory in New York City has been discontinued, and a new factory opened in Danbury, Conn. The company manufactures household ranges, together with hotel and restaurant electrical equipment, and electrical heating and drying appliances for mills and factories.

The Gamewell Fire-Alarm Telegraph Company, New York City, was the only bidder for the installation of a fire-alarm system in Holyoke, Mass. The company recently submitted a bid of $29,800 for a 12-circuit system, with fast and slow transformer, perforating register and other appurtenances. A bid of $23,500 was submitted in 1913 by the same company for an 8-circuit system. On the same basis, the new bid is about 13 per cent higher than the first, the increase being attributed to increased cost of labor and materials. The Fire Commissioners will recommend an appropriation for the installation of the system.

Experts Differ Widely on Plant Renewal Costs.—Wide differences have been revealed in the claimed reproduction value of the physical properties of the Philadelphia Electric Company submitted to the Pennsylvania Public Service Commission in the suit instituted by the City of Philadelphia in an effort to obtain reduced light and power rates. After an exhaustive appraisal conducted by Prof. D. C. Jackson, of Boston, the company recently submitted figures in which it put its replacement value at $51,562,000. Henry W. Ballard of Cleveland, expert for the complainants, contends that the plant could be replaced for $28,583,000. Mr. Jackson's appraisal valuations were higher for each item. Mr. Ballard did not place any valuation on brokerage, patents owned, or going-concern value.

German Price Advance for Machinery.—The leading firms in Germany belonging to the price convention for heavy electrical engineering manufacturers, have made a further increase of 10 per cent in the list prices, owing to the present situation of the market for raw materials, thus making a total advance of 40 per cent. The higher charges apply to machines and motors, including electrically driven ventilators, pumps, boring machines, etc., starting appliances, regulating resistances, controllers, oil, lever and automatic switches, and railway materials, while the list prices for machines and motors of over 100 horsepower, as well as for transformers, continue suspended. Further increases are reserved in the case of articles for purely peace services. Among the firms who have signed the circular announcing the alteration are the Allgemeine Elektricitäts Gesellschaft, Siemens-Schuckert, Bergmann and Brown-Boveri Works.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued the following publications: Leaflet No. 3763, on 532-B railway motors; Leaflet No. 3818, on type C push-button-control stations for use in automatic motor-starters and controllers; Folder No. 4201, called the "A B C of Automobile Battery Charging;" Leaflet No. 3823-A, on commutating-pole rotary converters, describing the effectiveness of the newer designs; Catalog No. DS846, on pole-line hardware; Catalog section IP54, on type CW slip-ring induction motors, a new type of pressed-steel motor for constant and variable continuous-duty service; Catalog section DS919, on switchboard meters for measuring pressure, current and energy; the January issue of "Westinghouse Railway Data Exchange." The company has also issued Leaflet No. 3504-A, on the selection of type CI alternating current motors for intermittent service; Leaflet No. 3513-A, on machine-tool controllers for direct-current motors; Leaflet No. 3832, on No. 307-CV railway motors; Leaflet No. 3834, on No. 306-CV railway motors; Leaflet No. 3836, on No. 548-A railway motors; Leaflet No. 3848, on types B and R rheostatic drum controllers, and Leaflet No. 3766-A, on large slip-ring type CW induction motors.

PERSONAL AND BIOGRAPHICAL

MR. JAMES BENNETT, formerly managing director of the Fire Prevention Company, Montreal, Canada, is now special agent for the Economy Fuse & Manufacturing Company, with headquarters in Chicago, Ill.

MR. G. F. EVANS has resigned from the position of illuminating expert for the Columbus (O.) Railway, Power & Light Company to become supervising engineer for the W. C. Moore Company of Columbus.

MR. S. E. SANDESON is now superintendent of the Intermountain Railway, Light & Power Company at Las Animas, Colo. He formerly was with the Utah Power & Light Company and other western concerns.

MR. U. S. ARNOLD is now the Oklahoma and Texas representative of the Commercial Electric Supply Company of St. Louis, Mo. He has previously been in the sales organization of the Western Electric Company in Dallas, Tex.

MR. C. F. PEARSON recently has been appointed general manager of the National Coil Company, Lansing, Mich. He was chief electrical engineer for the company during a period of 15 years prior to his appointment as general manager.

MR. C. R. BALDWIN tendered his resignation as manager of the Manhattan Electrical Supply Company, St. Louis, Mo., on February 25. Mr. Baldwin has not announced any definite plans for the future, but he will in all probability remain in St. Louis.

MR. ROBERT DUERER, who has been connected with the Houston (Tex.) Lighting & Power Company for 21 years, serving in the capacity of secretary-treasurer of the company during the past ten years, has resigned. MR. P. S. DAUNOY has been elected to the position.

MR. HENRY WILMERING, for five years chief accountant of the Oklahoma Gas & Electric Company, has resigned to serve the state in an expert capacity in connection with the freight and passenger railway case which is now being heard before the Corporation Commission.

MR. C. LOUIS ALLEN, formerly sales and advertising manager of the Pyrene Manufacturing Company, New York City, has been elected president to take the place made vacant by the retirement of MR. DARWIN R. JAMES, who recently was made president of the American Chicle Company.

MR. JAMES CLARK, JR., of the James Clark, Jr., Electric Company, and MR. SAMUEL RIDDLE, superintendent of transportation of the Louisville Traction Company, are two of the incorporators of the Louisville Auditorium Association, which is made up of citizens who have subscribed $300,000 toward a fund for construction of a public auditorium in Louisville, Ky.

MR. HARRY C. BROWN, formerly with the Crouse-Hinds Company, Syracuse, N. Y., has been appointed assistant secretary of the National Electrical Contractors' Association, and will be located in Utica, N. Y. Mr. Brown began his electrical work with the Crouse-Hinds Company a number of years ago, and of late years has been a traveling representative for the company in the United States and Canada. One of Mr. Brown's new duties will be to prepare the National Electrical Contractors' Association universal data and sales book, which gives information on electrical materials and products.

MR. R. S. WALLACE, who was elected president of the Illinois State Electric Association at the annual convention held in Champaign, February 24-25, as reported in last week's issue, is a native of Illinois and a graduate of the engineering college of the University of Illinois. Mr. Wallace has been in the public utility field about 15 years, during which time his work has been associated with various

R. S. Wallace.

branches of mechanical and electrical engineering. He is vice-president and general manager of the Central Illinois Light Company, Peoria, Ill., and has served it or its predecessors in various capacities beginning with that of chief engineer. During the past few years, Mr. Wallace has been largely instrumental in broadening the company's field of operations from the limits of the city of Peoria to include Pekin and about 25 cities and villages within a radius of 50 miles of Peoria. The Central Illinois Light Company furnishes gas, electric and heating service in Peoria and Pekin, and electric service in the remainder of its territory, which covers a large part of Peoria and several adjoining counties.

MR. GEORGE D. SMITH, for the past two years supervisor of agencies for the General Vehicle Company, Inc., has been appointed special assistant to MR. HARRISON G. THOMPSON, vice-president and general sales manager, Edison Storage Battery Company. He will make his headquarters at the factory and main office, Orange, N. J. Mr. Smith is widely known throughout the electrical industry, especially to central-station officials and operators who know him for his conscientious endeavor and successful efforts in placing the electric commercial vehicle on a firmer footing in the United States and Canada.

MR. CHARLES R. UNDERHILL, chief electrical engineer, the Acme Wire Company, New Haven, Conn., lectured on the subject of "Electromagnets" at the Rensselaer Polytechnic Institute, February 15; Union College, February 16; Worcester Polytechnic Institute, February 18; Cornell University, February 21; Franklin Union Industrial School, February 23; Massachusetts Institute of Technology, February 24; Lehigh University, February 25, and Stevens Institute of Technology, March 1. These lectures were delivered before the student bodies and engineering societies at the different educational institutions.

OBITUARY.

MR. GEORGE W. BANKS, for many years associated with the power industry and connected with the Podds Power Company of New York, now dissolved, died February 29, at his home in Mount Kisco, N. Y., aged 57 years.

MR. WILLIAM W. MILLS, one of the engineers who built the New York City subway and a former City Engineer of New York, recently died at his home in Los Eucinas, Cal., aged 71 years. He was graduated from Troy Polytechnic Institute in 1868, and was appointed City Engineer of New York a few years later. In 1881 he located in Pasadena, Cal., and became engineer of Los Angeles County. A few years later he returned to New York and joined the engineering staff of the subway. While engaged in this work Mr. Mills' health failed and he returned to California.

MR. HENRY W. POPE, one of the early telegraph operators and a coworker as an operator with Thomas A. Edison, died in his home in Bellerose, L. I., February 29, aged 67. Mr. Pope was born at Great Barrington, Mass., in 1849. At the age of 13 he worked as a telegraph operator in Boston with Mr. Edison, with whom he retained a close friendship. In 1864 Mr. Pope had charge of the war telegraph wire between Washington and New York and was in close touch with many prominent officials, soldiers and politicians. He claimed the honor of having installed the first telephone in New York City and the first electric light in Brooklyn. He was at his death connected with the American Telephone & Telegraph Company. Mr. Pope was a man of exceedingly kind disposition and had a great many friends. His brother, the distinguished electrical engineer, Franklin Leonard Pope, died several years ago, but he is survived by his brother, Ralph W. Pope, honorary secretary of the American Institute of Electrical Engineers.

CURRENT ELECTRICAL NEWS

Weekly Record of Construction Activities

EASTERN STATES.

SOUTH SEBEC, ME.—It is reported that the Milo (Me.) Electric Light & Power Company, C. D. Tawne, manager, is planning to extend its transmission lines to this place, and will supply energy for light and power.

MONTPELIER, VT.—The petition of the Montpelier & Barre Light & Power Company for permission to issue $300,000 in bonds to purchase the holdings of the Waterbury Light & Power Company, known as the Moody & Almon plant, has been granted in an order recently issued by the Public Service Commission.

MONTPELIER, VT.—The Eastern Vermont Public Utilities Corporation is the name of a new concern which seeks a certificate of incorporation from the state. The company asks the right to hold land, riparian, water rights and real estate, in the towns of Barnet, Groton, Ryegate, Stannard, Walden, Peacham and Danville, in Caledonia County, and Newberry in Orange County, and to hold and use water powers and to build dams, flumes, pipe lines, transmission lines, power stations, etc., for the generating of electrical energy for power, heat and light, and to issue bonds and notes and to mortgage its property, with a capital stock of $200,000. Among the subscribers are I. M. Frost, of Rutland; W. C. Clifford, of Bethel; Albert A. Daniel, of West Danville; E. F. Clark, of Groton, and F. Monroe Dyer, of 24 Broad Street, New York City.

RUTLAND, VT.—The Rutland Railway, Light & Power Company is extending its pole lines, for light and power service, to include a farming community in Pittsford.

CENTERVILLE, MASS.—Ways and means for securing electrical energy for street lighting are being discussed by interested citizens.

NEW BEDFORD, MASS.—The New Bedford Gas & Edison Light Company is to build a three-story electric power station. Stone & Webster, 147 Milk Street, Boston, will build and equip the plant.

OAKFIELD, MASS.—The Oakfield Light & Power Company has been organized with a capital of $10,000 to generate and distribute electrical energy.

SOUTH HADLEY, MASS.—The city has voted $2,000 for extensions to municipal transmission lines, and $7,050 for street lighting during the coming year.

WORCESTER, MASS.—The Worcester Electric Light Company, of which R. W. Rollins is president and general manager, will make an extension to its Webster Street power house building which will permit additions to switchboard facilities and space for additional turbine capacity. A 20,000-kilowatt Westinghouse turbogenerator will be installed later in the year. The dimensions of the power house, when completed, will be 150 by 183 feet.

BUFFALO, N. Y.—Councilman J. F. Malone is advocating a better lighting system for Delaware Park.

ELLENBURGH, N. Y.—Norman P. White, who is president of a company recently formed for the purpose of furnishing this place with energy for light and power, states that a water-power site on the Big Chazy River near here has been secured and will be developed. The company is capitalized for $30,000, and plans are being made to furnish service to nearby towns.

FORESTVILLE, N. Y.—A franchise has been granted the Silver Creek Electric Light Company to furnish electrical energy to local consumers.

SENECA FALLS, N. Y.—Plans and specifications have been received here for the new power plant of the Seneca Power Corporation, which is to be built at the new dam east of here during the coming summer. There is over $2,000,000 involved in the erection of the plant and the development of the power, and it is expected that the structure alone will cost more than $200,000. The plans call for an ornamental structure, 100 by 48 feet, to be erected at the north extremity of the dam. No preparations have as yet been made for the installation of electrical equipment. About 7,000 horsepower will be the initial capacity. Mortimer J. Barns is the engineer in charge.

BRIDGETON, N. J.—The Board of Public Utility Commissioners has granted permission to the Bridgeton Electric Company to issue capital stock for $50,000 for extensions and improvements.

BURLINGTON, N. J.—The City Council is considering a bond issue of $8,500, to provide for the installation of new electric pumping equipment at the municipal waterworks.

CLINTON, N. J.—The Board of Public Utility Commissioners has approved an ordinance granting the Jersey Electric Company to install a system at Clinton.

HOBOKEN, N. J.—The Board of City Commissioners has awarded a contract for street lighting to the Public Service Electric Company, at a cost of $80 per lamp a year. The Board is planning for the installation of a new street-lighting system to form a white way along Washington Street.

JERSEY CITY, N. J.—Property owners along Ocean Avenue are negotiating with the City Commission for the installation of an improved street-lighting system.

NEWARK, N. J.—The Common Council is planning for the installation of a new lighting system in the City Hall. Hooper & Company are the architects.

POMPTON LAKES, N. J.—The Commercial Power Company, Jersey City, is negotiating with the Borough Council for the purchase of the municipal electric power station, recently erected at a cost of about $75,000, and now operating at a profit. The Council has announced its intention of selling the plant if a suitable price is offered and a guarantee as to local electric rates.

TRENTON, N. J.—The State Assembly has passed a bill permitting the City Commissioners to install an underground conduit system in Mahlon Stacy Park.

HARRISBURG, PA.—Application has been made to the Public Service Commission for the approval of a merger of over 50 electric power companies in Western Pennsylvania into the West Penn Electric Company, of Pittsburgh, and for approval of purchases and mergers of electric lines and other properties of the same interests. No action has yet been announced.

HARRISBURG, PA.—The Pennsylvania Railroad Company has announced plans providing for the electrification of all tracks and switches in the Enola freight yards near here. It is expected to complete the work in about six months. The company is also making surveys for a second track from Pavonia to Mount Holly, N. J., with the ultimate plan of electrifying this branch of its system. It is proposed to use the same method of propulsion as on the main line out of the Broad Street station, Philadelphia.

PHILADELPHIA, PA.—Estimates are being prepared by the Electric Bureau for a new lighting system in Germantown Avenue.

YORK, PA.—In listing $665,000 additional first mortgage 30-year 5-per-cent gold bonds on the Philadelphia exchange, the York (Pa.) Railways Company states that $479,690 was issued for extensions, improvements, betterments and double-tracking on the parent company's lines of railway; $135,000 for acquiring and constructing a power plant for supplying energy to the York Railways Company and the Edison Light & Power Company, and $50,310 for the purchase of a majority interest in the York & Windsor Electric Light Company and the Edison Light & Power Company.

CENTERVILLE, MD.—The Commissioners here are making plans for the establishment of an electric lighting and power plant.

ALEXANDRIA, VA.—In order that it may extend the use of the telephone for dispatching trains over the entire line, from Alexandria to Salisbury, N. C., a distance of 330 miles, the Southern Railway has authorized the construction of two telephone circuits between Alexandria and Monroe, Va., 160 miles. The work will be under the direction of W. H. Potter, superintendent of telegraph.

FORK UNION, VA.—According to C. E. Crosland, the Fort Union Military Academy is preparing plans for four new buildings. A 15-kilowatt generator and other electrical equipment will be installed.

FRONT ROYAL, VA.—Improvements to the municipal hydroelectric power plant are being planned. An auxiliary steam plant may be erected.

TROY, N. C.—J. C. Hurley, of the Smithtown Power Company, recently incorporated with a capital of $300,000, states that the company is planning the development of a power site on the Little River, near Mount Gilead.

ADEL, GA.—The city water department, T. R. Sutton, superintendent, is planning to install a motor-driven centrifugal pump.

BLAKELY, GA.—Improvements to the electric lighting plant, of which E. R. Adams is superintendent, are being planned.

ELLAVILLE, GA.—The city contemplates voting $5,000 in bonds for the construction of an electric lighting plant and water works.

PEMBROKE, GA.—The citizens of Bryan County have a plan on foot whereby the town may be furnished with electric lights very economically. A large sawmill is being erected near here, which will have a large surplus of power, the plan being to utilize this power. The only additional expense would be in procuring a generator and wiring for lamps. L. B. Godbee is interested in the plan.

JACKSONVILLE, FLA.—The American Telephone & Telegraph Company will build a toll line down the Florida east coast to Key West, the line to parallel the Florida East Coast Railroad.

PLANT CITY, FLA.—This city is planning to build an electric lighting plant at a cost of $50,000. The Board of Public Works is preparing the plans.

NORTH CENTRAL STATES.

COLUMBUS, O.—A meeting of the stockholders of the Scioto Valley Traction Company will be held to authorize the directors to use the $200,000 first preferred stock of the company, which was created in 1908, for a new interurban station here.

DEFIANCE, O.—The Defiance Gas & Electric Company has increased its capital stock from $300,000 to $850,000. A number of extensions and improvements are being planned.

GREENSPRING, O.—The Greenspring Electric Light & Power Company has been organized with a capital of $10,000, by D. M. Scott, F. M. Audrish and others, to furnish electric service here.

ROSSVILLE, O.—Better electric lighting facilities are planned for this community by A. E. Moore and others.

GROVEPORT, O.—It is reported that the Scioto Valley Traction Company, of Columbus, will purchase the distribution system here and make improvements.

MASSILLON, O.—The Massillon Electric & Gas Company is planning to install an ornamental lighting system and make other improvements in its service.

COLUMBUS, IND.—The Bartholomew County Commissioners have accepted plans and specifications for a new lighting system for the county courthouse, which will cost $7,000.

BRISTOL, IND.—Representatives of both the Indiana & Michigan Electric Company and the Hawks Electric Company, of Goshen, have visited Bristol to make estimates with a view to submitting propositions for lighting the town.

EVANSVILLE, IND.—Plans for the electrification of the Evansville & Indianapolis

Railroad are being considered, it is reported, by the officials of the company.

GAS CITY, IND.—The city water and light department, T. S. McKee superintendent, is in the market for an engine-driven, direct-connected, 2,400-volt, three-phase, 60-cycle, revolving-field generator, with exciter.

MILROY, IND.—W. W. Barton, W. B. Crane and Frank McCorkle have organized the Milroy Light & Power Company, with a capital of $6,000, and will build a power plant here.

ALEDO, ILL.—The Tri-County Light & Power Company is planning to install an additional generating unit in its power plant here.

BROCTON, ILL.—Mayor J. M. Lewis will present to the Town Board a proposition to buy a municipal electric lighting plant.

EAST ST. LOUIS, ILL.—The Board of Education here has decided to install an electric lighting and power plant, to supply three of the city schools. Bids will be advertised in about two weeks.

MACOMB, ILL.—The city is preparing to install a cluster lighting system. All wiring for electric light and power and telephone and telegraph lines will be placed in underground conduit.

M'LEANSBORO, ILL.—Plans for extensions to the electric lighting system here are being considered.

MT. CARMEL, ILL.—The Oil Belt Railroad Company has secured an option for the development of a power site at the Grand Rapids dam above Mt. Carmel. It is proposed to develop power for industrial as well as traction purposes.

PARIS, ILL.—The Central Illinois Public Service Company has announced that the company's plant here will be practically rebuilt in the near future.

SPRINGFIELD, ILL.—Business men along Sixth Street, from Capital Avenue to Madison Street, have petitioned the Board of Local Improvements for the installation of an ornamental lighting system.

WHITE HALL, ILL.—At the coming city election a proposition to erect an electric lighting plant will be placed before the voters.

GRAND RAPIDS, MICH.—At a meeting of the Board of Public Works, W. H. Anderson and a number of other property owners on Oakes Street, between Division and Ionia Avenues, were granted permission to install single-standard boulevard lamps. The cost will be about $1,600.

KALAMAZOO, MICH.—The question of issuing bonds for the acquisition of a municipal electric lighting plant will be placed before the voters here.

MARQUETTE, MICH.—J. E. Sherman, Commissioner of Light and Power, is preparing estimates for the construction of a new electric power plant, to cost about $200,000.

WHITEHALL, MICH.—The Frugale Power Company of which Frank H. Speese is president, is planning to begin the construction of a power plant on the north branch of White River in the early spring. The new plant will cost about $100,000.

RACINE, WIS.—The merchants of State Street have petitioned for an ornamental street-lighting system.

WALWORTH, WIS.—The Southern Wisconsin Electric Company, Lake Geneva, has purchased the electric lighting plant here. The company will build a 33,000-volt transmission line to this city during the spring.

BARRETT, MINN.—An election will be held March 14 to vote on the question of issuing bonds for the establishment of an electric lighting system.

DASSEL, MINN.—The Public Service Company, of St. Cloud, has been granted a franchise to extend its electric light and power lines into and through this village.

MOUNTAIN LAKE, MINN.—The Consumers Power Company has been granted permission to erect and maintain poles, wires and appurtenances for transmission and sale of electrical energy here.

ST. PAUL, MINN.—The Western Union Telegraph Company will spend about $150,000 on improvements this year. All pole lines between St. Paul and Minneapolis will be replaced by underground conduit. Instruments, switchboards and other appliances at branches and the Pioneer Building offices and operating rooms will be supplanted by new equipment. C. A. Crane is local manager.

MECHANICSVILLE, IOWA.—An electric light plant will be installed here.

ST. ANTHONY, IOWA.—At a recent election a franchise was granted to the Iowa Railway & Light Company of Cedar Rapids, to furnish energy for light and power to St. Anthony. The energy will be supplied from the company's Marshalltown plant.

SHELDON, IOWA.—The holdings of the Sheldon Light & Power Company have been purchased by the Northern Iowa Power Company, Humboldt, Iowa. It is reported that the extensions and improvements to be made here will cost about $60,000, and will result in practically a new plant.

SIDNEY, IOWA.—The City Council is considering a proposition to grant the Continental Gas & Electric Corporation, of Cleveland, O., a franchise to install and operate an electric lighting plant here.

CARUTHERSVILLE, MO.—The Electric Light & Power Company has applied to the Public Service Commission for authority to issue $15,000 in stock to provide for proposed enlargements in its power plant.

GENESEO, KANS.—The municipal electric light plant, Chester Norman, manager, will extend its transmission lines this spring.

HUTCHINSON, KANS.—The ordinance embodying the contract with the United Water, Gas & Electric Company for additional lights for the city was passed by the City Commission. The total number of white-way clusters will be increased to 178, and a large number of incandescent lamps will be added.

MORGANSVILLE, KANS.—The City Council has passed an ordinance granting a franchise for the establishment of an electric lighting plant and distribution system here.

CONCORD, NEB.—Concord is planning to install a municipal electric lighting plant. The town of Dixon is also considering similar plans.

SCOTTSBLUFF, NEB.—It is reported that Wilkinson & Vandees, of Denver, who have purchased the holdings of the Cross & Roberts Electric Light Company, will build an interurban line between this city and Gering. They also plan to spend $50,000 for improvements to the electric lighting plant here.

PEEVER, S. D.—The business men of Peever have held several meetings recently for the purpose of discussing the matter of having the town provided with an electric light system. H. C. Kurrasch is interested in the plan.

ENDERLIN, N. D.—The Enderlin Electric Light & Power Company, F. A. Barnard, manager, plans to install additional generating equipment and will extend its transmission lines.

FORTVILLE, N. D.—Plans are in progress for the establishment of an electric lighting plant here during the year.

DATES AHEAD.

Wisconsin Electrical Association. Annual convention, Hotel Pfister, Milwaukee, Wis., March 16 and 17. Secretary, George Allison, First National Bank Building, Milwaukee, Wis.

Railway Signal Association. Annual convention, Chicago, Ill., March 20 and 21. Secretary, C. C. Rosenberg, Times Building, Bethlehem, Pa.

American Society of Mechanical Engineers, Spring meeting, New Orleans, La., April 11-14. Secretary, Calvin W. Rice, 29 West Thirty-ninth Street, New York City.

American Electrochemical Society. Semi-anual meeting, Washington, D. C., April 27-29. Secretary, J. W. Richards, Lehigh University, South Bethlehem, Pa.

Arkansas Association of Public Utility Operators. Annual convention, Little Rock, Ark., May 9-11. Secretary, R. B. Fowles, Pine Bluff, Ark.

Missouri Association of Public Utilities. Annual convention, May 11-13, on board boat leaving St. Louis May 11. Secretary, F. D. Beardslee, 315 North Twelfth Street, St. Louis, Mo.

Iowa Section, N. E. L. A. Annual meeting, Dubuque, Iowa, May 10-12. Secretary, W. H. Thomson, Jr., Des Moines, Iowa.

National Electric Light Association. Annual convention, Chicago, Ill. May 22-26. Secretary, T. C. Martin, 29 West Thirty-ninth Street, New York City.

National Electrical Contractors' Association of the United States. Annual convention, Hotel McAlpin, New York City, July 18-22. Secretary, G. H. Duffield, 41 Martin Building, Utica, N. Y.

HUNTER, N. D.—The Hunter Light & Power Company, J. B. Heckridge, president, is planning to install additional generating and switchboard equipment.

SOUTH CENTRAL STATES.

PROVIDENCE, KY.—The Board of Public Works has been given an appropriation of $21,400 for building a municipal lighting plant, and is now engaged in selecting a site.

WALTON, KY.—J. E. Kelley, of Pee Dee, N. C., has taken charge of the plant of the Walton Electric Light Company, which he has purchased of H. W. Mayfield. He will enlarge and improve the plant and proposes to give day service.

GURDON, ARK.—Richard Schwartz, Hot Springs, Ark., has been granted a franchise to install an electric lighting and power system. Two generating units, driven by fuel-oil engines, will be purchased.

VILLE PLATTE, LA.—A $10,000 electric light and power plant is proposed. Edwin Thompson has charge of the plans.

CHANDLER, OKLA.—Additional generating equipment, to increase the capacity of its plant by 200 horsepower, is being proposed by the Chandler Electric Company.

HENRYETTA, OKLA.—The electric power plant here has been purchased by the American Public Service Corporation, which also owns the plant at Okmulgee. The plans, as outlined, indicate that one central plant will be established here to furnish power for mining operations and to the towns of Morris, Dewar, Coalton and Okmulgee.

M'ALESTER, OKLA.—A court order has been issued authorizing the sale of the properties of the Choctaw Railway & Lighting Company, which operates an interurban line between McAlester and Hartshorne. Another order has been granted giving the receiver of the company authority to issue receiver's certificates in the amount of $130,000 for improvements and extensions. Among other plans, it is proposed to extend the lines of the company to furnish power to mine operators, and to purchase the power plant at Wilburton.

ARCHER CITY, TEX.—The City Council is considering ways and means for the establishment of a municipal electric lighting and power plant.

BALLINGER, TEX.—The Ballinger Electric Light & Power Company has been incorporated with a capital of $50,000 by R. H. Irvine, M. F. Treadwell and others.

COLUMBUS, TEX.—Sam Hamburger and Leo Steiner, who recently purchased the local electric light and power plant, will install new machinery and make other improvements.

DALLAS, TEX.—The International Electric Company has increased its capital stock from $160,000 to $210,000. Improvements will be made.

DALLAS, TEX.—The City Commission has called an election, to be held April 4, to vote on issuing $500,000 for the construction of a municipal electric light plant.

DALLAS, TEX.—The Texas Power & Light Company, through its board of directors, has authorized the sale of $200,000 bonds, the proceeds to be used for extensions and improvements to its electric power and transmission system. J. F. Strickland is president.

GILMER, TEX.—The Texas Public Service Company is planning to install a 75-kilowatt, engine-driven alternator.

HOUSTON, TEX.—The Houston Lighting & Power Company, S. R. Bertron, vice-president and general manager, is planning to install a 7,500-kilowatt turbo-generator in its main power house. Other plans for the extension of service to care for the growing needs of the city are being made, which will necessitate the installation of additional equipment. The company's general offices have been moved from New Orleans to Houston.

ORANGE, TEX.—The Lutcher & Moore Lumber Company has closed a contract with the Pawling & Harnischfeger Company, of Milwaukee, Wis., for the installation of a monorail system at its new mill, to be built here. The system will be 24,000 feet long and will include three hoists or carriers, twenty-seven switches and other equipment. It will be electrically operated.

SAN ANTONIO, TEX.—It is announced by D. E. Colp, president of the Meridian Highway Association, that arrangements have been made for installing an electric lighting system along the Meridian road in Texas for a distance of more than 300

miles. The energy for lighting will be furnished by the Texas Light & Power Company, of Dallas.

WESTERN STATES.

ANACONDA, MONT.—The Mountain States Telephone & Telegraph Company has voted to spend $3,950,000 for extensions and betterments to its system.

PUEBLO, COLO.—F. W. Cooper, local architect, is preparing plans for a new power house for the Colorado State Insane Asylum.

PUEBLO, COLO.—The Arkansas Valley Railway, Light & Power Company will construct a seven-mile extension from its lines at Rocky Ford to the town of Cheraw, where an alfalfa mill requiring 150-horsepower motors will be served, in addition to a number of farms en route and a certain amount of residential lighting in the village. The company will make another seven-mile extension from Manzanola to Crowley, where a 100-horsepower motor and 25 lighting customers will be connected.

DOS CABEZOS, ARIZ.—The large power plant of the Mascot Copper Company near here was destroyed by fire recently, and while the engines are not a total loss, it is said that it will take six months to reconstruct the plant.

PHOENIX, ARIZ.—The City Commission has instructed the City Engineer to make a survey and investigation with the view of determining the cost of constructing a municipal electric light and power plant here. At present the city is being supplied by the plant of the Pacific Gas & Electric Company.

SALT LAKE CITY, UTAH.—Le Grand Young has applied for a franchise to construct an electric railway from Tenth South Street on Twenty-first East Street, through Holliday, up Big Cottonwood to Brighton to the mines in the forks of the canyon.

BOISE, IDAHO.—Officials of the Electric Investment Company in Boise state crews of men have been dispatched to Twin Falls to remove the electric distributing system of the Idaho Power & Light Company, which serves the Twin Falls district. This territory is adequately served by the lines of the Great Shoshone Company, the pioneer electric system in southern Idaho, and since the merging of the two companies the Idaho Power distributing system will be unnecessary. At Buell, the distributing system of the Great Shoshone Company will be removed, and the Idaho Power & Light system will remain.

NAMPA, IDAHO.—C. A. Snyder, district wire chief for the Mountain States Telephone & Telegraph Company, has been here in connection with the extension of the company's service northeast from Bowmont to Kuna.

ONTARIO, IDAHO.—It is reported that the Electric Investment Company will make Ontario the central distributing point of its lines, which cover Southwestern Idaho and Eastern Oregon, and that the power lines from Oxbow, Twin Falls, Boise, Horseshoe Bend, etc., will converge at Ontario. W. L. Hall will be in charge of the Ontario offices. It is reported the company will immediately make repairs to the various transmission lines in this section, particularly the lines serving Emmett and Plymouth.

SPOKANE, WASH.—The Spokane Building Owners' and Managers' Association favors the erection of a lighting system on Riverside, west of Washington Street. A report on the cost of ornamental electroliers is being prepared by a special committee, consisting of O. E. Mallette and others.

KLAMATH FALLS, ORE.—Residents of the Malin section, 35 miles south of this city, have asked the assistance of Klamath Falls in securing an electric railway between the two places and through Poe Valley and Olene.

SALEM, ORE.—A permit for the use of one second-foot of water from Elk Creek has been issued to H. L. Ross, of Baker, by State Engineer Lewis. The water will be used in developing 120 horsepower for mining purposes, near Cornucopia. Water for the development will be carried through a pipe line 4,475 feet long, and the cost of the improvement will be $6,000.

SPRINGFIELD, ORE.—According to recent reports the Oregon Power Company will remove its offices from Eugene to Springfield. The local offices will be enlarged and remodeled, and the business in this territory will be handled from Springfield.

AUBURN, CAL.—The Pacific Gas & Electric Company has transferred its force from Christian Valley to Auburn Ravine, in preparation for beginning work on the Wise power house, the lowest on the Drum system.

BARSTOW, CAL.—Preparations are being made by the Southern Sierras Power Company for the extension of its lines from Kramer to this city.

CLAREMONT, CAL.—The Southern California Edison Company has applied for a 30-year franchise to distribute electrical energy in this city, and bids will be received for such a franchise by the City Council up to April 3.

COACHELLA, CAL.—The Board of Supervisors has accepted the bid of the Coachella Valley Ice & Electric Company to install incandescent lights in Coachella at a flat rate of $1.50 per lamp per month.

FRESNO, CAL.—The Board of Trustees has passed a resolution providing for the construction of an electrolier system on J Street, between Mercer and Tuolumne Streets.

LOS ANGELES, CAL.—Following a number of short-term contracts since the first of the year, an understanding has been reached with the Los Angeles Gas & Electric Corporation, under which it has agreed to file a bid for a period of four months for lighting 4,192 arc lamps, which costs the city about $27,000 per month. This agreement will carry the matter up to the beginning of the next fiscal year, when the new budget will be made up.

ORANGE, CAL.—The Board of Trustees has adopted a resolution accepting the report of the street superintendent, recommending the addition of 44 lights at street intersections in the residential district.

SALINAS, CAL.—Mayor Thorup has taken up the matter of cost of installing an electrolier system with the Coast Valley Gas & Electric Company, and will report to the City Council.

SANTA BARBARA, CAL.—A plan is under way for the installation of an ornamental lighting system on State Street.

MEXICO.

SATILLO, COAHUILA, MEXICO.—The State Government has awarded the contract to the General Electric Company, of Dallas, for the installation of an extensive system of ornamental street lighting here. The electric light and power plant is owned by a German company, but it has been taken over by the Government.

Proposals

ELECTRICAL WORK.—Separate bids will be received by C. B. Sawyer, Kankakee, Ill., until March 25, for the electrical work for the new Elks' clubhouse at Kankakee.

WIRING SYSTEM AND FIXTURES.—Sealed bids will be opened in the Supervising Architect's office, Washington, D. C., April 3, for a conduit and wiring system, lighting fixtures, etc., in the postoffice at Lewiston, Me. For details see proposal columns.

ELECTRICAL WIRING.—Separate bids will be received by the president of the State Normal University, Normal, Ill., until March 21 for the electrical wiring and elevator for a dormitory building. Plans and specifications may be obtained from J. B. Dibelka, State Architect, 130 North Fifth Avenue, Chicago, Ill.

LIGHTING SYSTEM.—Sealed bids will be received for the installation of an ornamental and a general street lighting system by the City Council of the City of Berwyn, Ill., until 8 o'clock, March 21, in the Berwyn City Hall, at which time and place said bids will be publicly opened. The estimated cost is about $15,000. Address J. R. Shean, Jr., City Clerk.

TRANSFORMERS.—Sealed proposals will be received by the City of Chicago, March 13, at room 406, City Hall, for furnishing and delivering at the municipal power stations, Twenty-sixth Street and California Avenue and Thirty-first Street and Sacramento Avenue, light and power transformers, according to plans and specifications on file in the office of the Department of Public Works. W. R. Moorhouse, Commissioner of Public Works.

LIGHT AND POWER SYSTEM.—Bids for installing the light and power system in a storage building of the Port of Seattle's East Waterway Terminal Improvement will be received by the Port of Seattle Commission, Bell Street Dock, Seattle, Wash., until 1:30 p. m., March 22. Plans and specifications can be obtained from C. E. Remsberg, secretary. Check for 5 per cent of amount of bid, payable to the Port Commission, must accompany each bid. Bidders are invited to submit alternative bids upon designs of their own.

ELECTRICAL SUPPLIES.—Bids will be received at the Bureau of Supplies and Accounts, United States Navy Department, Washington, D. C., for furnishing supplies at the following naval stations: Schedule 9363—Newport, R. I., 25,000 feet double-conductor cable, six circuit panels and miscellaneous electrical supplies. Schedule 9364—Boston, Mass., six induction motors. Schedule 9370—Brooklyn, N. Y., 35 ship and motor-boat bells. Bidders desiring to submit proposals should make application for schedules to the Bureau or Purchasing Office nearest to navy yard where delivery is to be made.

Financial Notes

At the meeting of the board of directors of Electric Bond & Share Company for organization, E. W. Hill, formerly treasurer and assistant secretary, was elected a vice-president and A. E. Smith, formerly assistant secretary and assistant treasurer, was elected treasurer and assistant secretary. E. P. Summerson and William Reiser were elected assistant secretaries and assistant treasurers. Other officers were re-elected.

Kansas Electric Utilities Company has sold to Chicago, Grand Rapids and New York bankers $1,150,000 first mortgage 10-year 5-per-cent bonds. Kansas Electric Utilities was organized in 1915 and acquired the Lawrence Railway & Light Company, Emporia Railway & Light Company and Parsons Railway & Light Company. Gross of the company in 1915 was $290,706 and net $120,550. In addition to the Kansas companies, Kansas Electric Utilities also owns all the capital stock of Sidney (Ohio) Electric Company, Union City (Ind.) Electric Company and United Lighting Company of Albion, Pa., and net of these companies, which was $23,509 in 1915, is also applicable, in addition to earnings above, for payment of interest on these bonds.

The American Power & Light Company is offering to holders of its preferred and common stock and to holders of its option warrants for common stock an opportunity to subscribe to an issue of $6,984,000 100-year six-per-cent debenture bonds in the ratio of 50 per cent of their stock holdings at 93 and accrued interest. Stockholders are given the privilege of subscribing to the bonds between March 1 and 15. The net earnings of the company as reported for the year ended December 31, 1915, in-

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Mar. 6	Feb. 28
American Tel. & Tel. (New York)	127⅜	127⅛
Commonwealth Edison (Chicago)	143	143
Edison Electric Illuminating (Boston)	246	248
Electric Storage Battery common (Philadelphia)	63½	64⅞
Electric Storage Battery preferred (Philadelphia)	63½	64⅞
General Electric (New York)	166½	169
Kings County Electric (New York)	129	129
Massachusetts Electric common (Boston)	6½	6⅝
Massachusetts Electric preferred (Boston)	36	36
National Carbon common (Chicago)		180
National Carbon preferred (Chicago)	122	
New England Telephone (Boston)	135¾	136
Philadelphia Electric (Philadelphia)	27¼	27¾
Postal Telegraph and Cables common (New York)	80	80
Postal Telegraph and Cables preferred (New York)	67¾	67
Western Union (New York)	88	88¼
Westinghouse common (New York)	62¾	64⅝
Westinghouse preferred (New York)	75	76¼

cluding the net surplus of subsidiaries, amounted to $1,043,092.

Dividends.

Allis-Chalmers	Q	1.5 %	Apr. 15
Ark. Val. Ry. & Lt. pf.	Q	1.75%	Mar. 15
Braz. Trac., Lt. & Pw. pf.	Q	1.5 %	Apr. 1
Brock. & P. St. Ry. pf.	—	3 %	Mar. 15
Brooklyn Rapid Tran.	Q	0.5 %	Apr. 1
East. Pw. & Lt. pf.	Q	1.5 %	Mar. 15
Elec. Prop. Corp. pf.	Q	1.5 %	Mar. 10
Elec. Stor. Bat. pf.	Q	1 %	Apr. 1
Elec. Stor. Bat. com.	Q	1 %	Apr. 1
Galv.-H. Elec. pf.	—	3 %	Mar. 15
Manhat. Bg. 3c L.	Q	1.5 %	Mar. 1
Manhattan Ry.	Q	1.75%	Apr. 1
Manila Elec. R. R. & Lt.	Q	1.5 %	Apr. 1
Muskogee Gas & Elec. pf.	Q	1.75%	Mar. 15
Standard Gas & Elec.	Q	1 %	Mar. 15
Third Ave. R. R.	Q	1 %	Apr. 1
Twin City Rap. Tran. com.	Q	1.5 %	Apr. 1
Twin City Rap. Tran. pf.	Q	1.75%	Apr. 1
Unit. Trac. & Elec., Prov.	Q	1.25%	Apr. 1
Unit. Lt. & Rys. pf.	Q	1.5 %	Apr. 1

Reports of Earnings.

ELECTRIC BOND & SHARE.

Electric Bond & Share Company reports income account for the year ended December 31, 1915, as follows:

	1915	1914
Gross income	$1,820,337	$1,558,521
Net income	1,401,085	1,137,042
Preferred dividends	344,647	298,392
Balance	1,056,438	838,660
Common dividends	433,778	400,000
Surplus	622,660	438,650

DOMINION POWER.

Dominion Power & Transmission Company report income account for the year ended December 31, 1915, as follows:

	1915	1914
Gross earnings	$2,353,956	$2,395,967
Expenses and taxes	1,352,001	1,390,847
Net earnings	1,001,955	1,005,120
Maintenance reserve	109,640	101,024
Interest charges	384,771	377,106
Surplus	507,543	526,990

PACIFIC TELEPHONE & TELEGRAPH.

The Pacific Telephone & Telegraph Company reports for the year ended December 31, 1915, compared as follows:

	1915.	1914.
Gross earnings	$20,114,458	$19,221,602
Expenses	15,385,722	14,396,168
Net earnings	4,728,736	4,825,434
Interest	2,707,136	2,565,258
Surplus	2,021,600	2,260,175
Preferred dividends	1,920,000	1,920,000
Surplus	*101,600	340,175

*Equal to 0.56 per cent on $18,000,000 common stock, against 1.88 per cent on same stock previous year.

MACKAY COMPANIES.

The Mackay Companies has issued its report for the year ended January 31, 1916. The income account compares as follows:

	1916	1915
Income	*$4,274,941	$4,246,014
Preferred stock	2,000,000	2,000,000
Common dividends	2,069,020	2,069,020
Operating expense	55,741	60,585
Surplus	150,180	116,410

*Equal to 5.49 per cent on $41,380,400 common stock, after allowing four per cent on $50,000,000 preferred, as against 5.42 per cent on same stock previous year.

WASHINGTON WATER POWER COMPANY.

Washington Water Power Company reports income account for fiscal year ended December 31, 1915, as follows:

	1915	1914
Gross earnings	$2,750,485	$2,976,426
Net after taxes	1,510,980	1,613,828
Interest, amortization and discount	462,323	254,093
Depreciation reserve	325,000	325,000
Surplus	723,657	1,094,446
Dividends	851,950	1,094,446
Deficit after dividends	128,293	417

New Incorporations

SCHENECTADY, N. Y.—The Schenectady Power Company has increased its capital stock from $500,000 to $1,000,000.

NEW YORK, N. Y.— Bilt-Well Sign System (Electric), Inc. Capital, $10,000. Incorporators: George Tierman and others, of 64 Wall Street.

REESEVILLE, WIS.—Central Wisconsin Public Service Company. Capital, $25,000. Incorporators: J. O. Meyers, A. R. Meyers and G. C. Schmitt.

ROCHESTER, N. Y.—Wizard Electric & Manufacturing Company. Capital, $10,000. Incorporators: A. F. Bircher, C. H. Sampson and J. L. Whitley, all of Rochester.

NEW YORK, N. Y.—John Bennett Bissell, Inc. Capital, $10,000. Electrical contracting. Incorporators: John Bennett Bissell, W. L. Goeltz and J. A. Anderson, all of 50 Broad Street.

ELIZABETHTOWN, KY.—The Rex Revolving Light Company, Vine Grove, has increased its capital from $15,000 to $25,000. J. R. Davis, Ullie Richardson and W. D. Carter are the principal stockholders.

TRENTON, N. J.—The New Jersey Gas & Electric Company. Capital, $500,000. Incorporators: E. H. Van Wyck, Crawford, N. J.; W. E. McClintock, Dover, N. J., and A. A. Bridgham, New York, N. Y.

New Publications

HOSPITAL MANAGEMENT.—The Crain Publishing Company, Louisville, Ky., has issued the first number of this publication, a feature of which is a department for industrial hospitals. The leading article for February describes the hospital of the Youngstown (O.) Sheet & Tube Company.

CANADIAN MINES.—The Mines Branch of the Canadian Department of Mines, Ottawa, has issued its summary report of 232 pages, with illustrations, for the calendar year 1914. In addition to the director's general report there are individual reports of a number of the staff.

TERRESTRIAL MAGNETISM—The annual report of the director of the Department of Terrestrial Magnetism, Carnegie Institution of Washington, has been separately printed for distribution. It gives a summary of the work done in the magnetic surveys of oceans and land areas in 1915.

STATE LEGISLATION.—A joint committee of the National Association of State Libraries and American Association of Law Libraries, F. O. Poole, secretary, 42 West Forty-fourth Street, New York City, is publishing weekly an "Official Index to State Legislation," which is an index covering all bills in every state legislature.

Electrical Patents Issued February 29, 1916

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,173,165. Lightning Arrester. L. S. Brach, New York, N. Y. Electrode carrier resiliently mounted in vacuous container.

1,173,190. Composite Conductor Cable and Method of Making the Same. W. Hoopes, assignor to Aluminum Company of America, Pittsburgh, Pa. Steel core, aluminum envelope, with former under greater initial tensile stress.

1,173,192. Elevator-Signaling Apparatus. P. T. Kenny, New York, N. Y., assignor to Elevator Supply & Repair Co. Up-and-down, push-button, car-signaling system.

1,173,214. Spark-Plug Assembling Machine. C. H. Postel, assigner to Champion Spark Plug Co., Toledo, Ohio. Fluid-operated; for assembling shell and porcelain.

1,173,235. Elevator Safety System. G. S. Williamson, New York, N. Y., assignor to Shurloc Elevator Safety Co. Control of floor light.

1,173,239. Railway Signal-Lantern. A. A. Ziegler. Compact structure, comprising two electromagnetically controlled lamps.

1,173,240. Electromagnet. A. A. Ziegler, Boston, Mass. Manner of securing core to carrying plate.

1,173,254. Switch Selector. A. F. Dixon, assignor to Western Electric Co., New York, N. Y. Key-controlled electromagnetic device for telephone systems.

1,173,260. Electric Switch. G. Griffith, Parsons, Kans. Magnetically operated knife switch.

1,173,269. Signaling Device. C. Heidemann, St. Louis, Mo. Device for securing on hand, including push-button-controlled battery lamp.

1,173,280. Focusing Lamp Socket. G. C. Knauff, Chicago, Ill. Permits lamp adjustment along reflector axis.

1,173,324. Spark-Gap Mechanism. D. M. Sweeney, San Francisco, Cal. Details of device having adjustable electrodes.

1,173,322. Telephone Cable Box. K. F. Wincrantz, C. E. J. Nilson and C. F. Petterson, assignor to Aktieboleget Stockholm-Stelefon, Stockholm, Sweden. Structural details.

1,173,334. Electrical Control Apparatus. R. Amberton, London, England. Rheostat lever interlocked with automatic line switch.

1,173,338. System for Operating Time-Recorders or Time-Indicators. J. W. Bryce, assignor to International Time Recording Co., Endicott, N. Y. For indicating time of day and elapsed time.

1,173,346. Method for the Manufacture of Chlorates and Perchlorates of Alkali Metals. A. E. Gibbs, Wayne, Pa. Comprises electrolyzing a chlorid solution.

1,173,360. Apparatus for Displaying Announcements, Advertisements and the Like. A. B. Lang and J. A. Powell, assignors to Telenews (1914) Limited, London, England. Magnetic paper shifter in tele-writer projection device.

1,173,370. Arc-Light Electrode. W. R. Mott, assignor to National Carbon Co., Cleveland, Ohio. Rare earth fluorids and thorium fluorid mixed with conducting material.

1,173,393. Sparking Plug for Internal Combustion Engines. C. Spada, Milan, Italy. Details of structure, including priming means.

1,173,394. Joining or Bonding the Junctions of Metallic Sheathing or Armoring of Electric Conductors. L. Sunderland, Westminster, London, England. Overlapping portions secured by eyelets with caps covering openings.

1,173,400. Suspension Clamp. R. A. Willson, Spokane, Wash. Comprises arcing rods.

1,173,406. Magneto Coupling. C. Balough, assignor to Kelly-Springfield Motor Truck Co., Springfield, Ohio. Permits angular adjustment of driving and driven shafts.

1,173,409. X-Ray Apparatus. C. E. Campbell, Lynn, Mass. Arrangement of table and tube.

1,173,418. Pole Cross-Arm. C. G. Ette, assignor to St. Louis Malleable Casting Co., St. Louis, Mo. Manner of securing to pole.

1,173,438. Automatic Brake for Elevators. P. Kesten and H. Osborne, assignors to Siemens-Schuckert-Werke, G. M. B. H., Berlin, Germany. Car controls electromagnetic brake and field of generator in Leonard system.

1,173,448. Time-Controlled Automatic Switch. R. McKnight, Sarnia, Ontario, Canada. Operated by clock mechanism.

1,173,452. Electric Condenser and Process of Making the Same. M. Meirowsky, Porz-on-the-Rhine, Germany. Plate condenser having dielectric, consisting of alternate layers of paper and synthetic resin.

1,173,460. Electric Switch. C. A. Palmgren, Chicago, Ill. Time-controlled; for recording temperatures.

1,173,467. Process of Treating Zinc Ores. C. C. Titus and W. J. Barenscheer, assignors to New England Electro-Chemical Metals Co., Boston, Mass. Cyclical process of treating complex ores containing zinc.

1,173,471. Coil-Press. N. Wilkinson, assignor to Allis-Chalmers Mfg. Co., Milwaukee, Wis. For shaping coils.

1,173,511. Automatic Spark-Controller for Engines. C. V. Hess, Sonora, Cal. Timer controlled from engine governor.

1,173,540. Portable Electrotherapeutic Apparatus. J. E. Seeley, Los Angeles, Cal. assignor to Vulcan Coil Co. Section producing oscillatory currents and detachable current-modifying sections.

1,173,541. Spark-Plug. W. E. Sherbondy, assignor to Bigsby Rotary Mfg. Co., Cleveland, Ohio. Thin, easily heated disk of refractory material in end of casing and surrounding central electrode.

1,173,552. Train-Controlling Device. A. L. Bower, Boyerton, Pa. Train-stop device having air valves controlled by track circuit and periodically closed train circuit.

1,173,559. Diaphragm Horn. L. Chollet, assignor to Lovell-McConnell Mfg. Co., Newark, N. J. Motor-operated diaphragm.

1,173,560. Semi-Automatic Telephone Exchange System. H. P. Clausen, assignor to Western Electric Co. Party-line system.

1,173,562. Radiotelephone Transmitting System. W. T. Ditcham, Twickenham, England. Spark-gap discharger for wireless telephony.

1,173,564. Operator's Calling Device. A. H. Dyson, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. For telephone system; comprises impulse keys and electromagnetically driven automatic switch.

1,173,568. Fan. G. B. Griffin, assignor to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Guard structure.

1,173,569. System of Distribution. F. W. Harris, assignor to Westingnouse Electric & Mfg. Co. Arrangement of circuit breakers in feeder circuit system.

1,73,570. Electrolytic Measuring Instrument. H. S. Hatfield, Brunswick, Germany. Rhodium cathode on gold base.

1,173,572. Lamp Shade. W. F. M. Hawe, Pittsburgh, Pa. Collapsible; comprises flexible fabric on telescoping rings.

1,173,577. Alarm and Signaling Device. M. R. Hutchinson, assignor to Lovell-McConnell Mfg. Co. Horn with motor-operated diaphragm.

1,173,584. Mechanically Actuated Diaphragm Horn. J. W. Jones, assignor to Lovell-McConnell Mfg. Co. Horn with motor-operated diaphragm.

1,173,592. Horn Cut-Out and Motor Control Alarm for Motor-Vehicles. D. A. McConnell, Arlington, N. J. Horn controlled by push button when ignition circuit closed and by gear shift lever when ignition circuit opened.

1,173,593. Trolley-Operated Contact. J. F. McElroy, Albany, N. Y. Combined trolley-wire switch and suspension.

1,173,598. Fuse Device. L. O. Mellor, Evanston, Ill. Fuse plug has arc-extinguishing fluid.

1,173,609. Electric Switch for Automatic Passenger-Fare-Registering Mechanism. H. Savage and W. L. Baker, San Antonio, Tex. Details of rotary disk and plunger contact device.

1,173,616. Storage-Battery Carrier. M. I. Stone, assignor to W. P. Stone, Boston, Mass. Suspended from vehicle.

1,173,621. Terminal Connector for Curling Irons and the Like. F. Thornton, assignor to Westinghouse Electric & Mfg. Co. Automatic switching device.

1,173,630. Method and Means for the Production and Control of Current Impulses. C. I. Zimmerman, Milwaukee, Wis. Condenser charge and discharge sparking arrangement.

1,173,632. Circuit Interrupter. C. Aalborg, assignor to Westinghouse Electric & Mfg. Co. Oil switch with auxiliary shunt resistance break.

1,173,635. Mechanical Horn. O. C. Arlitz, assignor to Lovell-McConnell Mfg. Co. Motor-operated diaphragm.

1,173,641. Turning Signal for Automobiles. J. J. Bassett, Maspeth, N. Y. Device on dash has illuminated globes moved out and inside of vehicle on pivoted arms.

1,173,642. Equalizer-Yoke. W. E. Belcher, Washington, D. C. For supporting insulators; steel plate structure with discharge horn.

1,173,651. Storage Battery. W. A. Crowdus, assignor to J. P. Mentzer, Chicago, Ill. Structure of couple comprising active sheets and separators.

1,173,655. Phantom Circuit. F. H. Fay, T. Shaw and J. J. Pilliod, assignors to American Telephone & Telegraph Co., New York, N. Y. Arrangement of telephone side circuits furnishing a phantom circuit.

1,173,657. Alternating-Current System. L. Fleischmann, assignor to General Electric Co., Schenectady, N. Y. Resonance of circuit maintained with different generator speed. (See cut.)

1,173,673. Electropneumatic Air Brake System. G. Macloskie, assignor to General Electric Co. Interlocked electrical and pneumatic air-brake operating means.

1,173,679. System for Producing High-Frequency Oscillations. M. Osnos, Berlin, Germany, assignor to General Electric Co. In wireless system; alternating generator supplying oscillatory circuit driven by direct-current motor and has fields in shunt and series, respectively, with the motor, a sending key being in shunt with series field.

1,173,684. Trolley Catcher. F. J. Roche, Somerville, Mass. Details of spring-actuated reel.

1,173,699. Electrical Flame-Arc Furnace for Oxidizing the Nitrogen of the Air. H. Bonnevie, assignor to Norsk Hydroelektrisk Kvaelstofaktieselskab, Christiania, Norway. Special structure with magnetically dispersed arc.

1,173,702. Telegraph Transmitter. C. Bell, Centralia, Mo. Details of device comprising vibrator.

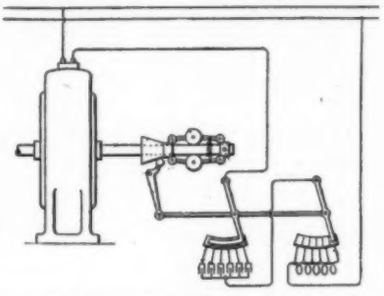
1,173,709. Apparatus for Purifying Water. E. Claussen, Hagen, Germany. Float-controlled solenoids, etc., for regulating water flow.

1,173,711. Circuit Coupling. H. A. Douglas, assignor to Douglas & Rudd Mfg. Co., Bronson, Mich. Push plug and socket.

1,173,716. Magnetic Coin-Testing Mechanism for Coin-Controlled Machines. A. G. Grover, assignor to Autosales Gum & Chocolate Co., New York, N. Y. Insertion of magnetic disk causes closing of gate across coin chute.

1,173,754. Automatic Recorder for Telephone Messages. H. G. Stalker, Navan, Ontario, Canada. Electromagnetic device controlled by receiver hook.

1,173,764. Automatic Valve-Operating Mechanism. I. M. Baldwin, assignor to



No. 1,173,657.—Alternating-Current System.

American Thermostat Co., Elmira, N. Y. Thermostatically controlled switch mechanism.

1,173,772, 773, 776 and 777. Telephony. E. R. Corwin, assignor to F. B. Cook Co., Chicago, Ill. First, second and fourth patents: Subscriber-controlled master switches control link connectors. Third patent: Special connectors at exchange for accidentally grounded lines.

1,173,774. and 775. Telephony. M. L. Johnson, assignor to F. B. Cook Co. First patent: Subscribers notified of terminations of periods of service. Second patent: Arrangement of recording receivers.

1,173,788. Baseball-Game Exhibitor. E. E. Fairchild, assignor to W. R. Hearst, New York, N. Y. Special rotary-contact device.

1,173,791. Combined Fuse and Switch Box. E. Frye, Dorchester, Mass. Unitary structure having oil switch in one compartment and fuse plug in another.

1,173,803. Electric Light Socket. P. M. Hotchkin, Chicago, Ill. For attachment to outlet box.

1,173,804. Offset Floor Fitting and Connection. P. M. Hotchkin. For fitting in floor of show case.

1,173,874. Record-Punching Machine. S. Scogamillo, New York, N. Y. Punches electrically controlled by pattern sheet.

1,173,889. Ventilating Washer for Knife-Blade Fuses. J. W. Steelman, assignor to

No. 1,173,889.—Ventilating Washer for Knife-Blade Fuses.

J. C. Harrigan, Camden, N. J. Ventilates interior of cartridge fuse. (See cut.)

1,173,,896. Chain End. G. B. Thomas, assignor to the Bryant Electric Co., Bridgeport, Conn. For pull-socket chain.

1,173,922. Automatic-Signaling Device. C. L. Bopp, Hawkeye, Iowa. System for indicating location of railway trains.

1,173,945. Burglar-Alarm Apparatus. W. H. Gabel, Kintyre, N. D. Casing having electromagnetically controlled battery and bell circuit.

1,173,951. Manufacture of Sheet Silicon Alloy. O. Graef, assignor to the firm of Bismarckhutte, Bismarckhutte, Germany. Method of treating plate of metal alloyed with silicon to increase permeability and reduce hysteresis.

1,173,957. Wireless Telegraphy or Telephony. W. Hahnemann, Kiel, Germany. Subaqueous or ground-signaling system.

1,173,960. Electric Furnace. I. Hechenbleikner, assignor to Southern Electro Chemical Co., New York, N. Y. Supporting means for movable electrode in arc furnace.

1,173,962. Electric Fuse. W. D. Hensell, Waverley, New South Wales, Australia. Successive portions of continuous fuse wire brought into operation.

1,173,965. Galvanic Battery. W. Hickman, assignor to Chemische Fabrik Griesheim-Elektron, Frankfort-on-the-Main, Germany. Depolarizer for Leclanché cell comprising acid manganite.

1,173,966. Automatic Gas Shut-Off. E. J. Hinkson, Erie, Pa. Electromagnetically controlled; closes when gas pressure decreases.

1,173,984. Portable Electric Lamp. F. M. Rosenfeld, New York, N. Y. Details of battery flash lamp.

1,173,994. High-Tension Insulator. S. Barfoed, Oakland, Cal., assignor of two-fifths to O. Gibson, San Francisco, Cal. Suspension type.

1,174,002. Insulator. V. P. Ettinger, Kansas City, Mo. Details of grooved supporting insulator with provision for draining the groove.

1,174,006. Thermostatic Circuit-Breaking Apparatus for Electrical Heaters. J. E. Harvey, Milton, Mass. Comprises thermostatically tripped circuit breaker and heated body to which breaker is responsive.

1,174,007. Electric Flasher. O. L. Heeger, St. Paul, Minn. Holder comprises spring contacts momentarily closed by striking holder against an object.

1,174,023. Railway-Signaling Device. H. R. Nevins, Hartford, Conn., assignor to Nevins Wallace Train Control Co. Wheel-tripped mechanism for train control, mounted in track.

1,174,024. Train-Stop Mechanism. H. R. Nevins, assignor to Nevins Wallace Train Control Co. Modification of above.

1,174,025. Heating Unit for Meters. H. N. Packard, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Resistor on circular frame for mounting in conduit.

1,174,027. Electric-Circuit Terminal. J. Amon, New York, N. Y. Mounting for conductor terminals providing readily detachable connection.

1,174,029. Telegraphy. W. Finn, assignor to Western Electric Co. Transmitting arrangement.

1,174,030 and 1,174,031. Electric Stove. W. S. Hadaway, New Rochelle, N. Y. First patent: Manner of securing resistor to heating plate. Second patent: Resistor between plates united to form water-tight container.

1,174,032. Electric Heater. W. S. Hadaway. Electrically heated chafing dish.

Reissue 14,076. Electric Controller. A. C. Eastwood, assignor to the Electric Controller & Mfg. Co., Cleveland, Ohio. Original No. 1,013,754, dated Jan. 2, 1912. Motor resistance controlled by successively operated interlocked magnetic switches controlled by master switch.

PATENTS EXPIRED.

The following United States electrical patents expired on March 7, 1916:

620,593. Electrical Storage Battery and Plate Therefor. R. Kennedy, Bradford, Eng.

620,609. Motor. E. S. Pillsbury and Ferdinand Schwedtmann, St. Louis, Mo.

620,626. Electric Measuring Instrument. C. R. Weymouth, Alameda, Cal.

620,640. Electric Incandescent Lamp. F. M. F. Cazin, Hoboken, N. J.

620,654. Electric Railway. R. M. Hunter, Philadelphia, Pa.

620,665. Electric Arc Lamp. M. S. Okun, New York, N. Y.

620,682. Apparatus for Controlling Operation of Motors. C. E. Woods, Chicago, Ill.

620,683. Process of and Apparatus for Reducing and Oxidizing Salts. T. A. Uehling, Cleveland, O.

620,715. Connector for Electrical Conductors. P. Minich, Independence, Mo.

620,733. Telephone System. C. L. Boice, Detroit, Mich.

620,745. Telephone Central-Office Circuit. H. M. Crane, Boston, Mass.

620,746. Means for Impressing Semi-cycles of Electromotive Force on Electric Circuits. A. C. Crehore, Hanover, N. H., and G. O. Squier, U. S. Army.

620,759. Electric Arc Lamp. C. Eschwei, New York, N. Y.

620,778. Transmitter for Multiple Telegraphs. W. A. Houghtaling, New York, N. Y.

620,783. Electrical Regulators. W. H. K. King, Carthage, Mo.

620,806. Electric Train Signaling System. B. C. Seaton, St. Louis, Mo.

620,839. Electric Switch. W. B. Bernardini, Lakewood, and W. Ely, Providence, R. I.

620,852. Electric Railway. J. F. Munsie, New York, N. Y.

620,855. Thermochemical Electric Battery. M. L. Severy, Boston, Mass.

620,864. Electric Clock. J. Butcher, Melrose, Mass.